WITH PENNSYLVANIA SUPPLEMENT

ESSENTIALS of GEOGRAPHY

BRIGHAM AND McFARLANE

SECOND BOOK

REVISED EDITION

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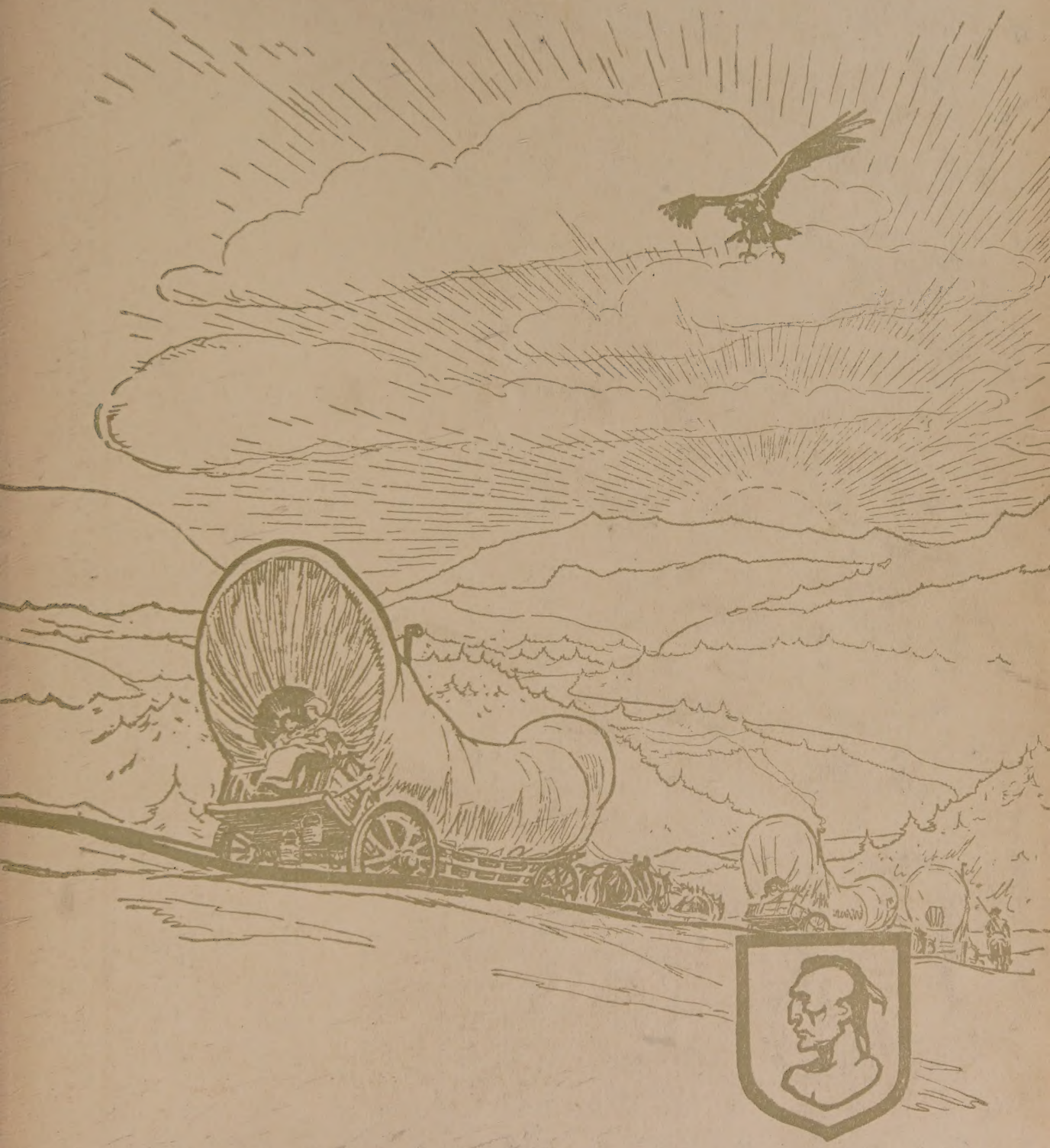

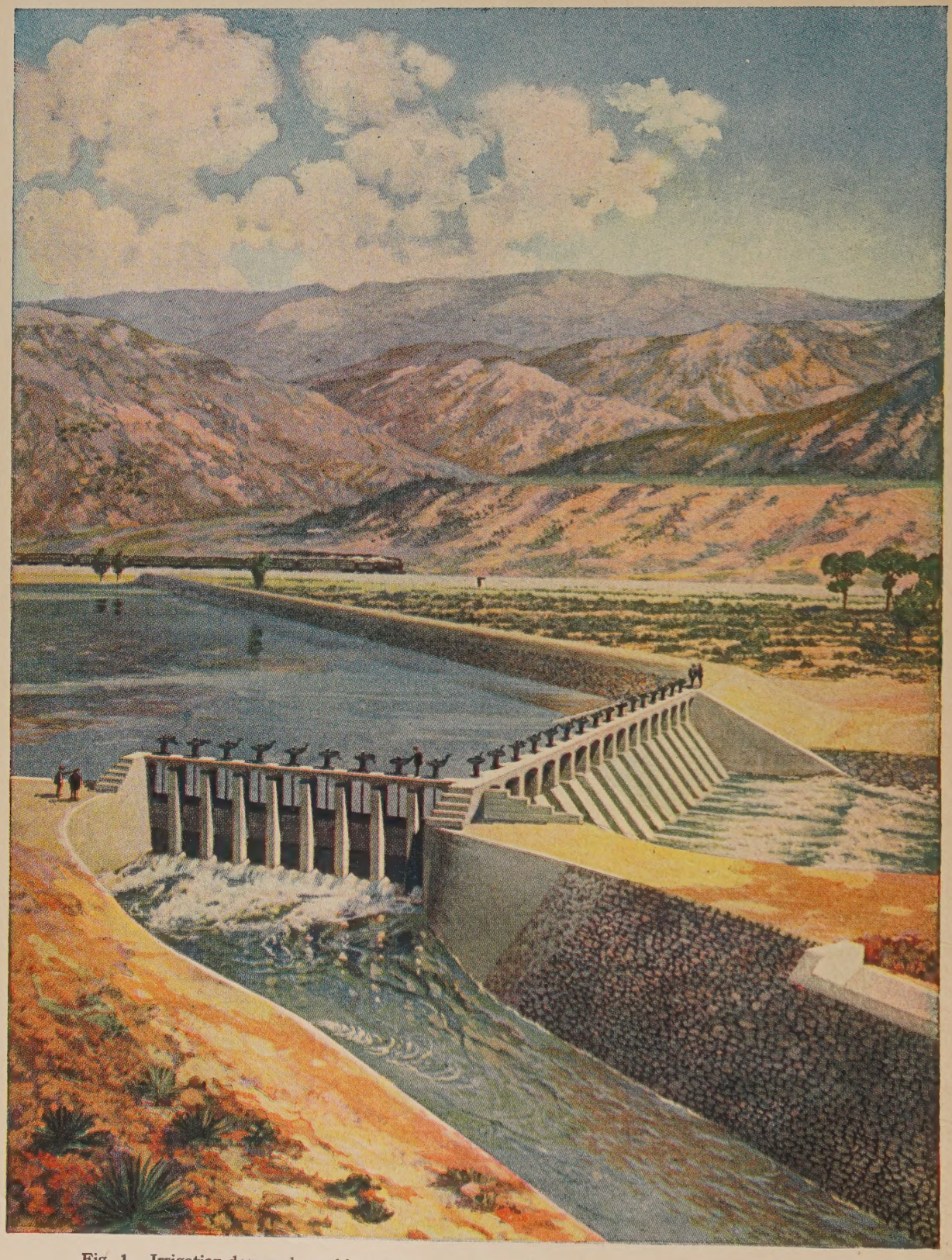

Fig. 1. Irrigation dam and canal in the dry western part of the United States. The Truckee-Carson storage dam, Nevada

ESSENTIALS *of* GEOGRAPHY

SECOND BOOK

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ESSENTIALS OF GEOGRAPHY, SECOND BOOK.

E. P. 116

PREFACE

In this series of texts it is recognized that the physical and the human are coördinate branches of geography.

Every important phase of physical geography is sufficiently covered, but care has been taken not to give it the emphasis which is suited only to the high school or the college.

In pursuance of emphasis on the human side of geography, the materials and modes of life, industry, and trade are given more than the usual proportion of attention. Moreover, industries and the growth of trade centers furnish out-door material for teaching in every locality; while routes of transportation and the contribution of the whole world to the needs of a single community can be so studied as to give the pupil inspiring ideas of the unity of the world and its people.

The map is the central feature in geographic instruction. Hence great care has been taken to reach excellence in the maps of this series. Essential features are shown, but minor features are omitted to avoid vagueness of impression. For this reason it is necessary to omit the smaller cities and towns of each state or region, although some of the omitted cities in densely populated states may be places of considerable size. The contour maps of the United States Geological Survey now cover wide areas and are of such general interest that they have been given special explanation.

In the text, the causal relation is central and vital, but emphasis is also placed upon the study of location, as in the map questions that precede leading divisions of this book, and in the reviews that follow. Location should also be pressed home in the study of industrial, commercial, and other phases.

The principles and forces with which physical geography deals are brought in at appropriate points of application in the regional treatment. Thus rivers and valleys are studied in a passage that leads to the account of the drainage of North America; and volcanoes are explained in connection with the study of a well-known volcano, Vesuvius.

In the handling of all great topics, concentration and unity are sought, so that the reader will not have to depend on diffused and scattered notices. Wheat, for example, is described as fully as possible in the account of the region where it first appears in a large way, that is, the North Central States. In like manner iron is treated with Pittsburgh, and irrigation with the Plateau States.

Because of the difficulty of the subject, a progressive treatment has been adopted in the study of the atmosphere, and the student is led by simple steps to a knowledge of the main facts. Under North America, climate is studied as to range of temperature, the westerly winds, and the northeast trades. Under the United States the subject is expanded by a study of rainfall and by an explanation of cyclonic movements and storms. The theme is further advanced under the several state groups. The southeast trades and the westerly winds of the Southern Hemisphere are taken up under South America. Following the treatment of the ocean, the various facts about winds are brought together and amplified, and a view of world winds is presented.

The earth as a whole and its astronomical relations are treated in a simple manner in the First Book of the series, and the fuller study is then postponed to the end of the Second Book, when the pupil is best prepared to understand the more detailed facts then presented.

The authors gratefully acknowledge the helpful suggestions of many expert teachers of geography. For assistance in illustration, they are greatly indebted to several departments of the United States Government, to many American Consuls in foreign countries, to a large number of industrial establishments, to boards of trade both at home and abroad, and to the personal kindness of many geographers in America and Europe.

Albert Perry Brigham
Charles T. McFarlane

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MAIN IDEAS IN GEOGRAPHY

THE EARTH SHAPES MAN'S WAYS OF LIVING

1. Life in the Far North.—On the distant Arctic shores of North America live a few scattered tribes of Eskimos. There are no forests or fields to give them nuts, grain, vegetables, or cultivated fruits. They get most of their food from the flesh of the seal, walrus, sea birds, and fish, and therefore must live near the sea. Their clothing is made of furs and skins, because these are the only materials at hand and because such clothing is warm. In their search for food they use canoes and sleds made of bone and skin, and many of their tools are made of bone. In the short summer they live in tents of skin, and in the winter their permanent homes, if they have any, are made of stones, sod, and earth, partly underground; but they often camp in huts quickly built out of blocks of snow (Fig. 2). The blubber of the seal gives them not only food, but also light and heat. Their manner of life is very different from that of many Eskimos who live farther south.

Fig. 2. Snow hut built by Eskimos

Fig. 3. Hut of tropical savages

2. In Tropical Forests.—The lands near the Equator are hot, except on high mountains, and usually have heavy rains. In such regions trees and other plants grow very rapidly. Hence there are dense forests, with a rank undergrowth. With little labor the savage in these hot lands may live upon bananas, breadfruit, sago, or coconuts. He needs but little clothing, and such as he has is made of grasses, bark of trees, and fibers of other plants. Of poles and grasses he builds such shelter as he needs to protect himself from the burning sun and beating rains (Fig. 3).

For the Eskimos life is hard, for the savages in the tropics it is easy; but in each case the life of the people is shaped by the physical condition of the country in which they live.

3. On Dry Plains.—In Asia, from Manchuria in the east to Arabia in the southwest, are found dry grasslands, or *steppes*, which support the flocks and herds of many wandering tribes. Horses, cattle, and sheep form the wealth of these people, and the milk and flesh, wool and skins, supply food, clothing, and shelter. The animals are pastured on the open steppe, near springs where they can be watered. When the flocks and herds have eaten the grass of one place, they are driven to other springs and to fresh pastures.

Fig. 4. Iron furnaces near Pittsburgh

The people gain skill and courage in their wanderings, and have no desire to live in one place and till the soil. The men who tend the great herds and flocks on the grassy plains of Argentina and Australia live with their herds much as do these wandering tribes of central and western Asia.

4. **Life in a New Country.**—The influence of the earth upon the way men live is shown also among pioneers in new countries, and even among the older civilized peoples. The pioneers of our own country lived almost as simply as the red men among whom they came. Like the savages, they fished and hunted, and sometimes wore garments of skin; but they cut down trees and built log huts for their houses and barns, cleared the fields as fast as they could, and cultivated more corn, fruits, and vegetables than the Indian ever thought of growing. The farmer was his own blacksmith and tool maker. The housewife and her daughters spun and wove the wool and flax and made the garments for the family. With tallow candles for light, wood for fuel, and food grown on the clearing, each family supplied its own needs.

Like the wanderer of the grasslands, the pioneer used the things that were about him.

5. **In a Region of Coal and Iron.**—If you were to visit the neighborhood of Pittsburgh, you would find iron furnaces (Fig. 4) and coal mines, coal barges on the river, trainloads of coke and iron ore, and piles of steel rails and girders, and you would hear the noise of industry everywhere. Men by tens of thousands work in the mines and furnaces, man the railroad trains and river boats, and tend the smoking coke ovens. Other thousands keep shops to supply food and clothing for the workers, and care for the schools, churches, and hospitals, while smaller numbers practice law and medicine, conduct banks and boards of trade, and attend to the government of the great city. The lives of all these people depend more upon the making of iron than upon any other work.

Fig. 5. Making steel, near Pittsburgh

Because there is much coal in the hills, water in the rivers, and good transportation for iron ore and for the finished products of iron, the people of Pittsburgh live mainly by the iron industry. The land, the water, and the minerals influence them, as the Arctic climate influences the Eskimos, and as the steppe shapes the habits of the wandering herdsmen.

6. Influence of Mountains, Seas, and Plains.—The Swiss mountaineer dwells in a narrow valley between high mountains, and usually lives in a small village by a stream. He builds his house with overhanging roof (Fig. 6), out of wood from the forests on the mountain side. He has a little land by the stream for garden and grain, but cuts his hay and pastures his cattle on the slopes as far up among the rocks as grass will grow. He makes butter and cheese for home use and for sale, and may spend the winter evenings in carving wooden trinkets to sell to the summer traveler.

Fig. 6. Swiss farmhouse

Norway is a mountainous country with a long seacoast. Like the Swiss, the Norwegian pastures his cows on the high slopes and brings down hay for winter use; but much of the year he is out in the fishing fleet (Fig. 7), or as a sailor he goes over all seas to the ports of every nation, helping to carry the world's goods.

On the prairies of our own country there is neither mountain nor sea, but a wide stretch of fertile soil. Here man tills the fields, raises crops of corn and oats, fattens stock, and sells grain, cattle, and hogs to pay for the things he needs. Like the Swiss, the Norwegian, and other people, the prairie farmer is under the influence of the land in which he lives.

7. How the Earth Influences Man; Summary.—In the far north there is little heat and much ice and snow. On the steppes there is moisture enough for grass, but not enough for forests or grain. In most tropical regions there is much heat and much rain. Such differences in the amount of *heat* and of *moisture* determine, to a very large extent, the way in which men live.

Among high mountains much land is waste and much is good only for pasture. On the prairie there is little waste land, and many modern machines can be used in the fields. Hence the *forms of the land* help to shape the life of man.

Life on the prairies, or in the Swiss mountains, is very different from life on the sea border in Norway. In many countries the *presence* or *absence of the sea* is important.

In Pittsburgh and similar regions the *minerals* and the *facilities for transportation* by roads and rivers control the destiny of the people.

Everywhere the earth influences man.

Fig. 7. Fishing boats in a harbor, Norway

MAN IS A TRADER

8. Commerce.—Influenced thus in different ways, men become different from one another. In the ground and in the rocks they find various things, and out of minerals, plants, and animals they make different things. The Eskimo of the farthest north has little to sell and cannot buy much, but he would give a valuable skin for a piece of wood or a bright trinket. The savage in tropical forests may collect rubber or the material for useful drugs which he himself cannot use. The Swiss makes more cheese than he can use, or he makes toys or embroidery or silks or watches for the markets of the world. The Norwegian sells fish and buys flour from over the sea, because his small fields do not produce grain enough to furnish him with bread. The iron of Pittsburgh is exchanged for meat and flour from the West, and even the herdsman of the steppes will buy a little grain of the farmer whom he meets in his wanderings.

The more men have of their own and the more they travel, the more they want of what others find or make; so they exchange, or *trade*, with one another, and thus establish commerce. In a single town, the dry-goods merchant, the grocer, the baker, the druggist, the hardware man, and the printer sell their goods and buy others that they need. The townsman trades with the farmer, and both with all the world.

Fig. 8. Market place in Nuremberg, a German city

Fig. 9. Loading cotton at Galveston, a Texas seaport

The silver or copper or timber of the mountains is exchanged for the wheat, corn, and meat of the plains. The hot lands send us their rubber, coffee, rice, and fruits; the cold lands send us their furs; and from different nations we buy such a variety of things as Persian rugs, Japanese vases, Swiss embroidery, British woolen goods, and French silks. We send, in return, cotton, wheat, steel rails, typewriters, sewing machines, locomotives, agricultural implements, and automobiles.

Wherever men live, there is opportunity to gain by exchanging their surplus goods for other kinds of goods produced in different parts of the world. All men are traders.

MAN CHANGES THE EARTH

9. Altering the Earth's Surface.—In doing so many things men make great changes upon the surface of the earth. In many countries vast forests have been cut away, and replaced with roads, houses, and fields. Great cities stand where the pioneer found the stillness of the woodland. Under the city, the soil and rocks are honeycombed with basements, tunnels, drains, and sewers. In the country, excavations are made for roads, drains, wells, quarries, and mines. Harbors are dredged, canals are dug, swamps are drained, and dikes are built to keep out the sea. Everywhere the farmer, the gardener, and the landscape artist are covering the earth's surface with plants of their own choice.

Man destroys many animals that he does not want, and teaches others to do his work. He not only harnesses the beasts, but he compels the waters, steam, electricity, and the winds to carry him from place to place, and to aid him in tilling the soil, in making what he wants, and in sending his messages.

Where the city of New York now stands Henry Hudson saw only some wooded islands when he sailed by them a little more than three hundred years ago. The city of Chicago has been built on a low, swampy plain which less than a hundred years ago bore only a small military post. On the prairies one now sees great cities, railroads, roadways, farm buildings, fields, and factories where once there were only vast grasslands over which roamed herds of buffalo.

Describe the changes which men have made in the region where you live.

WHAT GEOGRAPHY IS

10. Geography.—We have seen that the earth influences man, and that man makes changes in the earth. The plants, animals, and men of one region are very different from those of many other regions. Geography tells what some of the differences are, and how men live together, influenced by the earth and by one another.

Geography is the study of the earth and its products, of man and his industries, and of their influence upon each other.

Review.—1. Where do some Eskimos live? Describe their homes, food, and clothing. 2. What is the food of the tropical savage? 3. How do people live on the steppes of Asia? 4. Name other parts of the world in which men live in the same way. 5. What did the American pioneer make for himself? 6. What is the chief industry of Pittsburgh? 7. Compare the lives of the Norwegian and the Swiss mountaineer. 8. When a Norwegian moves to a farm on the prairies of Iowa, how does his manner of life change?

9. Why do men exchange things with one another? 10. What products of the western prairies are needed in Pittsburgh? 11. Why cannot all countries make the same things?

12. What changes does man make in the surface of the earth? 13. How did your home region look before the white man came to it?

14. How do the climate and natural products of your region influence the life of your family and of your neighbors? 15. Without using the words of the book, define geography.

Fig. 10. Bridge and office buildings, Chicago

Fig. 11
Political
NORTH AMERICA

Fig. 12. Wheat field, Canada, after the reapers have finished their work

NORTH AMERICA

Map Study.—1. What country is crossed by the Tropic of Cancer? 2. What countries are crossed by the Arctic Circle?

3. What waters separate Greenland from the Dominion of Canada? 4. Using the scale of miles, find the width of Hudson Bay from east to west. 5. By what ways may a ship go from the Gulf of Mexico to the Atlantic Ocean? 6. Name and locate three peninsulas belonging to North America. 7. Locate each of these islands: Newfoundland, Cape Breton, Cuba, Jamaica, Vancouver Island. 8. Name the Great Lakes. 9. What large lakes lie wholly in the Dominion of Canada? 10. Name at least two large rivers that are partly in the United States and partly in Canada. 11. What is the chief river of Alaska? 12. What are the main tributaries of the Mississippi River? 13. Locate the Rocky Mountains, Sierra Madre, and Appalachian Mountains.

14. What river forms part of the boundary between the United States and Mexico? 15. What countries are north of the United States? 16. Name the seven countries of Central America.

17. Using the scale of miles, find the distance between New York and San Francisco; between New Orleans and Duluth. 18. What cities in the United States are directly north of the Isthmus of Panama?

THE LAND

11. Position.—North America lies in all three zones of the Northern Hemisphere. On the south it extends within 490 miles of the Equator. On the north the continent and adjacent islands extend far within the Arctic Circle, to a point about 450 miles from the North Pole.

The southern part of North America is a land of coffee, cotton, sugar cane, bananas, and rubber; a tropical country, where the forests are luxuriant, the weather is hot, and the midday sun is always high in the heavens.

In the middle part of the continent is the belt of wheat (Fig. 12), corn, oats, apples, and potatoes. The forests abound in oak, chestnut, maple, ash, walnut, and birch; in spruce, cedar, pine, and hemlock. Here a winter covering of snow melts with the approach of summer and is soon replaced by the springing green of crop and forest.

Fig. 13

Physical

NORTH AMERICA

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THE MATTHEWS-NORTHRUP WORKS, BUFFALO, N. Y.

In the far north is the country of stunted forest and of open grassland, or *tundra*, whose surface thaws a little during the few weeks of a short summer. The shores of this region are the land of the Eskimo and the polar bear, with the seal and the walrus in the adjacent waters. Here, even in midsummer, the sun at midday is low in the southern sky.

North America lies between two great oceans, the Atlantic and the Pacific. The oceans are wide in the temperate belt, in which most of the people live. It takes five or six days for fast ships to go from New York to the ports of England, France, or Germany, and two or three weeks are occupied by the voyage from San Francisco or Vancouver to Japan, China, or the Philippine Islands.

In the far north, Seward Peninsula in Alaska is within 40 miles of Asia, a distance so short that the canoes of native savages have carried them across from one continent to the other. The Atlantic Ocean also narrows at the north, so that Norse sailors were able to pass across a few hundred miles of open sea, from Scandinavia to Iceland, from Iceland to Greenland, and thence to the mainland of North America.

12. Size.—North America contains nearly one sixth of all the land of the globe. Asia and Africa are the only continents that are larger. Canada alone is almost as large as Europe, while the United States, including Alaska, is nearly as large as Canada. North America extends about 5000 miles from north to south, or one fifth of the distance around the globe. We think of the Yukon River (Fig. 14) as confined to a corner of the continent, and yet it is nearly 1900 miles long. As seen on the map, Hudson Bay does not seem very large, yet it is 900 miles long. Travelers on the Great Lakes may make a voyage for several hours out of sight of land.

Fig. 14. Yukon River. Drying fish

13. Coast Line.—Our continent has an irregular coast line. It is less broken than that of Europe, but much more broken than the sea border of Africa or of South America.

The Gulf of Mexico is the largest indentation in the coast line of North America. It is important as a trade route, because of the commerce of the Mississippi Valley and of the thriving cities along the shores of the Gulf. Hudson Bay is the great northern indentation, reaching to the heart of Canada, but the passage to the Atlantic is blocked with ice during the long winter. The Gulf of St. Lawrence and the St. Lawrence River, with the Great Lakes, allow navigation, during most of the year, to reach the fertile plains and several of the large cities of two great countries. Smaller, but very important because of their use as harbors, are the Chesapeake, Delaware, New York, and Massachusetts bays (Fig. 58). Inlets at Savannah and Charleston form other important harbors, but the south Atlantic shore is less irregular than that of the north Atlantic.

At the north of the continent is the group of barren islands that form the Arctic Archipelago. In spite of their great size, their position makes them far less valuable than the smaller islands of the east coast.

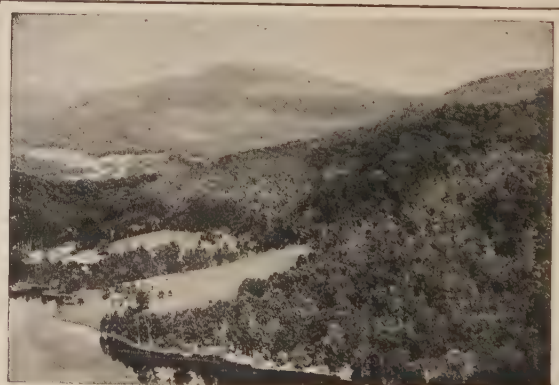
The western coast, especially that of Alaska and Canada, has many deep bays, and is bordered by bold headlands and rocky islands. Of the western bays the

Fig. 15. Rocky Mountains, Colorado, — part of the Cordilleras. Longs Peak, elevation 14,271 feet

largest is the Gulf of California, but the most important for commerce are Puget Sound and other protected waters behind Vancouver Island, the mouth of the Columbia River, and San Francisco Bay. South of San Francisco Bay, to Panama, there are few natural harbors.

14. **Surface.**—Two systems of highlands extend lengthwise of the continent. The greater is the *Cordilleran* system, which is on the west side. It is long, for it extends from Alaska to Panama. It is broad, for it reaches from San Francisco almost to Denver. It is also high; a large part of its surface is more than a mile above sea level. In Colorado and other states its higher peaks are nearly three miles in altitude (Fig. 15). In Alaska it includes Mt. St. Elias, and Mt. McKinley, which is the highest peak known in North America, rising 20,464 feet above sea level. The highest point of the Mexican Cordilleras is the summit of Mt. Orizaba. Its altitude is 18,314 feet.

The other system of highlands is the *Appalachian*, in the east. Its direction is nearly northeast and southwest, and it extends from central Alabama through eastern Canada. Its ridges and peaks are lower than those of the western highlands, and most of them are covered with forest to their summits (Fig. 16), while the higher Cordilleras rise to the region of bare rocks or perpetual snow. In the northern Appalachians, the highest point is the summit of Mt. Washington, in New Hampshire, 6279 feet above sea level. In the south the highest peak is Mt. Mitchell, in western North Carolina. Its altitude is 6711 feet, which is the highest point in the eastern half of the United States (Fig. 155).



U. S. Geological Survey

Fig. 16. Appalachian Mountains, North Carolina

Between the Appalachians and the Cordilleras, a broad *central plain* extends from the Gulf of Mexico to the Arctic Ocean. From the Gulf of Mexico one can go up the Mississippi and Minnesota rivers, down the Red River (of the North) and Lake Winnipeg, and pass west of Hudson Bay to the

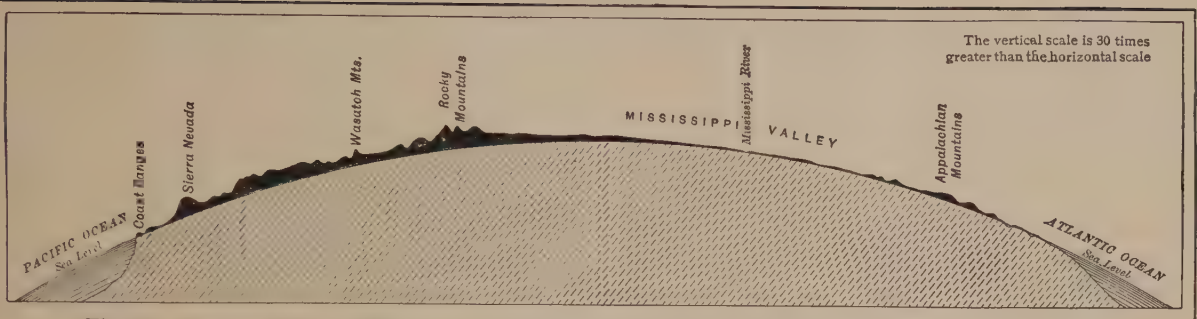


Fig. 17. East and west profile of North America, across the United States on the parallel of 39° north

Arctic Ocean, and never be as much as 1000 feet above sea level. Near the mountains, east or west, some parts of the central plain are much higher than this.

This plain is vastly wider than an ordinary valley, as it reaches from the Appalachians to the Cordilleras, a distance of many hundred miles. Figure 17 shows the curvature of the earth and the great width of the valley as compared with the height of the eastern and western mountains.

The western system of mountains reaches to the Pacific Ocean, and, excepting a few lowland valleys, the slopes of the mountains descend into the sea. East of the Appalachians, however, there is the *Atlantic Lowland*, sloping gently from the eastern foot of the mountains to the sea border.

It will be seen, therefore, that the surface of North America includes two systems of highland and two regions of lowland. The greater highland is in the west, the greater lowland is in the center, and the lesser highland and the smaller lowland are in the east.

Review.—1. How far from the Equator is the most southern part of North America? 2. Compare the products of the southern part of the continent with those of the middle part. 3. How long would it take to go from England or France across North America to China?

4. Compare this with other continents in size. 5. What is the largest country in North America? The second in size?

6. Compare North America with Europe and with Africa and South America as regards their coast lines. 7. What are the advantages of a broken coast line? 8. Compare the east and west coasts of the United States as regards the number of good harbors.

9. Locate and describe the Cordilleran highlands. 10. Where is the southern end of the Appalachian Mountains? 11. Give the location of Mt. Mitchell. 12. Compare the Appalachian highland with the Cordilleran in length; in breadth; in height. 13. Where are the high parts of the great central plain? The low parts? 14. How does the slope of the Atlantic borderland differ from that of the Pacific border?

RIVERS AND VALLEYS

15. Rivers.—Drops of rain falling on the forests and fields may soak into the ground, or they may form rills and run down the slopes to the nearest brook. Brooks and creeks, running together as they descend, form rivers. Much of the water that sinks below the surface moves slowly through the soil and rocks and comes out at some lower point as a spring that feeds a rivulet. If the water falls in the form of snow, the snow melts in due time and swells the rivers, perhaps to flood levels.

When water is exposed to the air, some of it mixes with air as an invisible vapor. This process is called *evaporation*. Most of the moisture in the air has evaporated from the surface of the ocean. The invisible vapor moves with the winds over the lands. When chilled, it condenses and forms clouds, composed either of very small drops of water or of minute snow crystals. These particles may unite and form larger drops or crystals, which fall to the earth as rain or snow.

The moisture that falls on the land finally gathers into rivers and flows to the ocean. Thus water is always journeying from the ocean to the land and back again to the ocean.

Rivers are so important in the geography of North America and of all other continents that we should understand how they act and what work they do. Running water, whether in stream or in roadside gutter, has power to pick up and carry or roll along with it fragments of earth or stone. The larger and swifter the stream, the larger the particles that it can transport. In mountainous or hilly regions, such *rock waste* is plentifully supplied to the streams. On the steep sides of the valleys rocks are broken up by water, which, in cold regions, freezes and expands in the crevices. Pieces of rock are often wedged off from ledges by the growing roots of trees. These fragments fall from cliffs or slide down the slopes and come within the reach of the current. Rivers that flow through plains carry away, at many places, the gravel, sand, and earth of which the banks are composed.

Some mineral substances, such as common salt, lime, iron, sulphur, and many others, are gradually dissolved by the water in the ground, and go with it into the rivers and the sea. These *dissolved* substances, which we cannot see, together with the mud, sand, gravel, and bowlders, which we can see, make up the *load* which the stream moves. When the stream flows swiftly, it carries or pushes the entire load, including the pebbles and bowlders. When it moves gently, it carries only the mud and the minerals that the water has dissolved.

The waste of the land, therefore, as well as the water, is always on its way to the sea.

16. The Formation of Valleys.—A stream makes a trough, at the bottom of which it flows. This trough is the *valley* of the stream. The stream wears the rocks and makes the valley deeper. The wasting of the rocks and the falling and sliding of the rocks and soil from the valley sides constantly make the valley wider.

Where a stream has not worked long, but has worked vigorously and cut down rapidly, its valley is a gully or gorge. Spanish explorers used the word *cañon* for such a narrow valley, and as they were the first to explore much of our western country, the gorges there are called cañons, or canyons. A gorge or canyon is a *young* valley (Figs. 18, 19, 239).

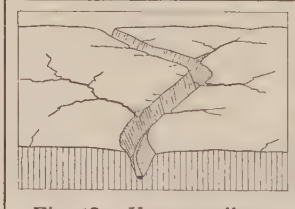


Fig. 18. Young valley

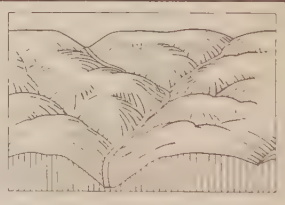


Fig. 20. Mature valley

Where the stream has worked a long time at its task, so that the sides of the valley have wasted until the valley has become wide, and the slopes are no longer

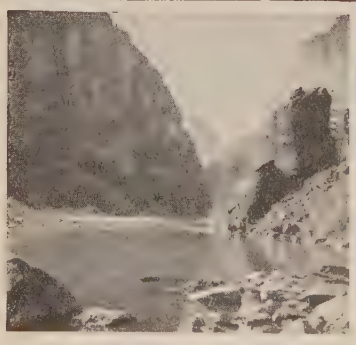


Fig. 19. Young valley

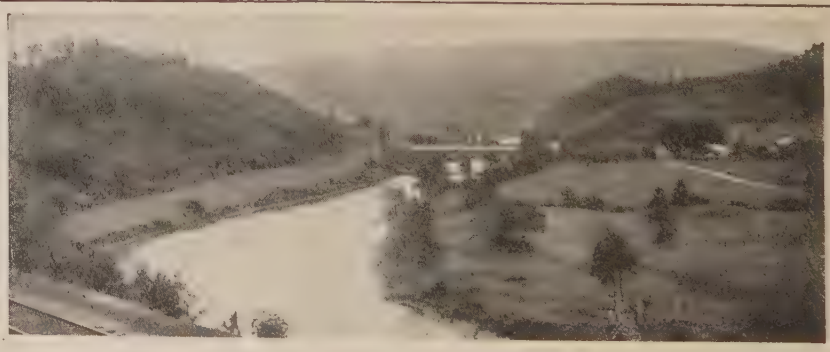


Fig. 21. Mature valley in Vermont

steep, we call the valley *mature* (Figs. 20, 21). Where the side slopes are almost worn away and the country nearly flat, we call the valley *old* (Fig. 92).

As these processes are going on all the time, the surface of the land is slowly changing its shape. In the course of long periods of time, narrow valleys widen and the separating hills are reduced to gentle slopes. Even mountains may be worn down to the level of plains.

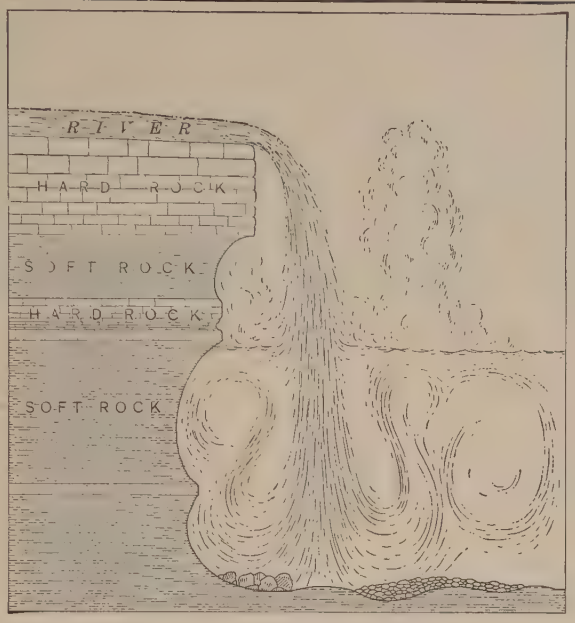


Fig. 22. Section of Niagara Falls

Waterfalls and rapids are of great use to man, because they supply power not only for mills at the falls, but also for the development of electricity used in moving cars, lighting houses, and running machinery even at a long distance (Fig. 23).

17. Waterfalls.—Young streams have many uneven places in their beds, because they have not had time to wear away the rocks. They may flow gently and smoothly for some distance and then flow more swiftly in *rapids*, or plunge over a cliff, making a *waterfall*. The Niagara Falls have been formed where a hard layer of rock crosses the bed of the stream (Figs. 22, 119). Below the falls the river flows through a deep gorge (Fig. 43) formed by the wearing away of the softer layers below and the breaking off of the hard layer thus left unsupported.

18. Floods.—Usually streams flow within their channels, that is, between banks. But after heavy rains or the melting of snows the waters rise, and may flow over the banks and flood the lowlands, or *river bottoms*, on either side. Floods undermine railways, wash out roads, carry off fences, and may bury good soil under a mass of gravel. But their work is not all bad. The water of most floods carries fine mud, or *silt*, which it brings from the higher lands and deposits on the flooded lowland. In this way the river has built the flat lands, or *flood plains*, bordering the river (Fig. 24). On these fertile bottom lands rich crops of grain, fruit, and vegetables are grown, and such lands furnish an easy grade along which to lay railway tracks.

Fig. 23. Power plant at a waterfall

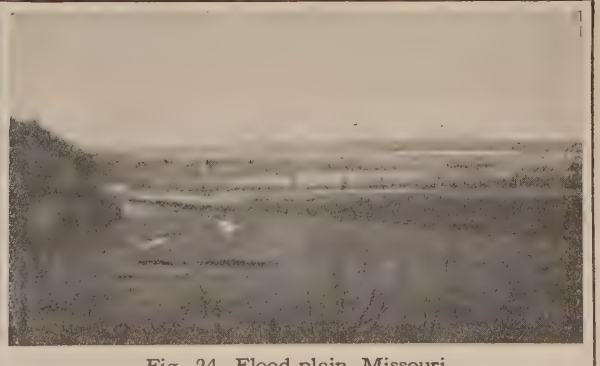


Fig. 24. Flood plain, Missouri

Fig. 25. Meanders in the Tennessee River, Tenn.

Fig. 27. Delta at the head of a mountain lake

19. Meanders.—If we observe a stream as it flows along its flood plain, we shall see that it has a winding course. It bends back and forth, sometimes doubling on itself in close, sharp curves. These are the *meanders* of the stream (Figs. 25, 26).

A very little cause may prevent a stream from flowing straight. If a farmer dumps a load of stones over the bank, or if the earth on one bank is held fast by the roots of a tree, the water will cut out a curve in the opposite bank. The water flows against this curve and is thrown back against the other bank a little downstream. So the water wears heavily first on one side and then on the other, and the curves increase from year to year until the stream may form a series of *oxbow loops*.

On the inside of each curve the water is shallow and the bank sloping. On the outside the current is swifter, the water is deeper, and the bank is steep. Here is the "swimming hole," or, if the stream is a great river like the Mississippi, here runs the steamer track, here the landings are made and towns arise.

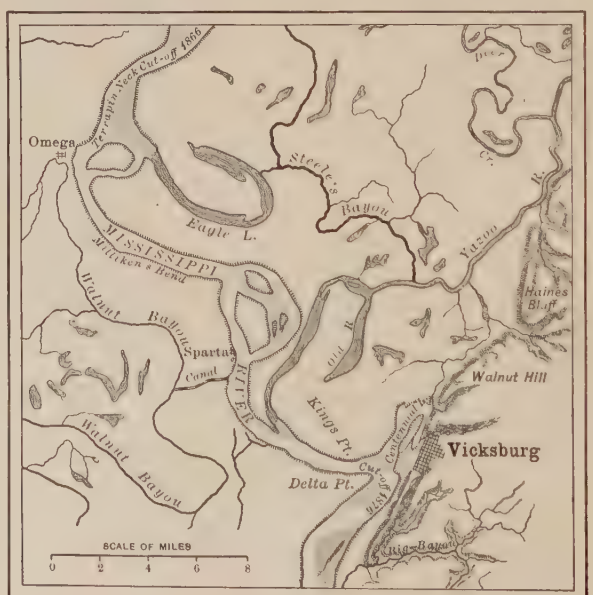


Fig. 26. Meanders in the Mississippi River

In flood time the river often breaks across the neck of an oxbow loop, leaving the loop full of still water, to become a lake. Many such lakes are found along the Mississippi River and its branches (Fig. 26).

20. Deltas.—A river is able to carry its load of rocky or earthy waste because its water is moving. When the motion slackens, the heavier parts of the load drop to the bottom. When the river enters a lake or the ocean, the current is lost and all the load is dropped, except the mineral substances that have been dissolved by the water, and are thus carried in an invisible state. In many cases the stream deposits so great a mass of earth that it builds up a broad, flat addition to the land, called a *delta* (Figs. 27, 28). The river may divide near its mouth, and enter the sea by several streams called *distributaries* (Fig. 28).

We do not need to see the Mississippi or the Nile or any other large river in order to see a delta. Deltas may be seen along many lake shores, or in the border of almost any roadside pool after a heavy shower.

21. Uses of Rivers.—What has here been said about the work of rivers will help us to understand the ways of streams when we see them, and will prepare us to study the great rivers of North America. Rivers are interesting because man uses them in so many ways. They supply water for domestic use, for manufactures, for fire protection, and for irrigation. They furnish the most economical form of power for every kind of industry. When deep and long, they may become highways of travel and transportation, and along their valleys are many of the greatest cities, richest farms, and finest roadways of the world.

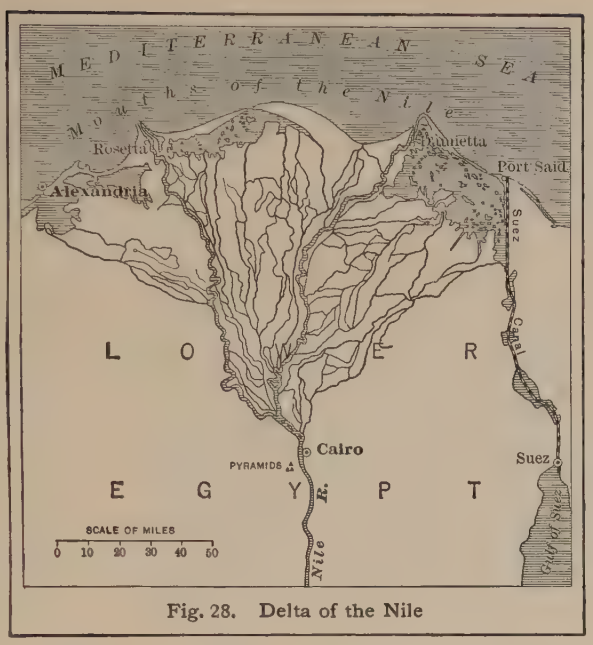


Fig. 28. Delta of the Nile

22. River Systems, Basins, and Divides. When several rivers unite, the main stream and all its branches, great and small, make a *river system* (Fig. 29). All the surface that is drained by a river and its tributaries is called its *basin*. The higher ground that separates one basin from another is a *divide*. If formed by a high range of mountains, the divide is narrow and has a sharp crest. But low hills often form divides, and the boundary between river basins may even extend across plains and marshes.

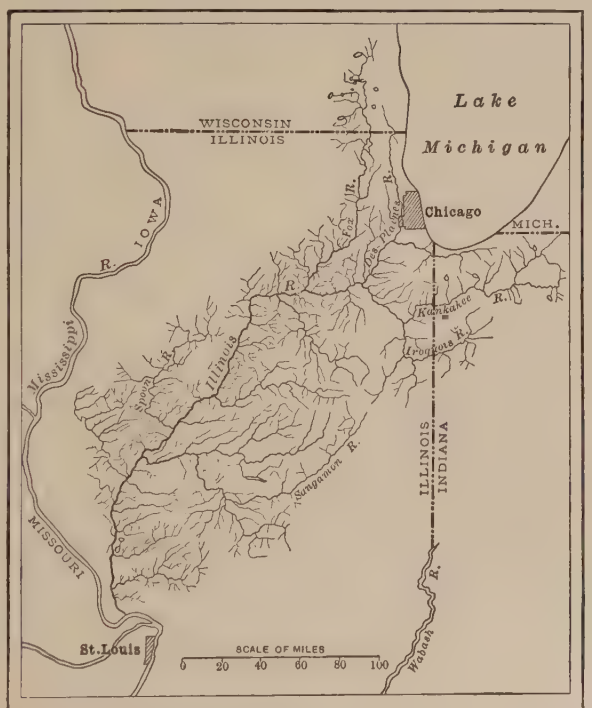


Fig. 29. A small river system—that of the Illinois River

23. Rivers of North America.—In North America there are seven great river systems.

The *St. Lawrence* system includes the Great Lakes and the rivers that flow into them, or into the St. Lawrence, from the United States and Canada. It discharges its waters into the Atlantic Ocean.

In the central lowland the *Mississippi* system drains into the Gulf of Mexico. This system includes the Ohio River and its tributaries on the east, and the Missouri, Arkansas, and Red rivers on the west. The distance from the head of the Missouri to the mouth of the Mississippi is 4200 miles. No other river in the world is so long as this. Northward, mainly in Canada, is the *Nelson* system, discharging into Hudson Bay. It includes Lake Winnipeg, the Saskatchewan River, and the Red River (of the North), a part of which is in the United States. Farther north, the *Mackenzie* system sends its waters into the Arctic Ocean. Its river basin is larger than any other in North America except that of the Mississippi.

Three systems discharge into the Pacific Ocean. The *Yukon* has its sources in northwestern Canada, crosses Alaska, and pours its waters into Bering Sea. The *Columbia* system belongs partly to the United States and partly to Canada. It drains the central portions of the Cordilleran region. The *Colorado* drains much of the western highlands of the United States, and flows into the Gulf of California.

Of these systems, the St. Lawrence and the Mississippi are of great importance for navigation. The lower part of the Columbia River also has considerable shipping. The Nelson, Mackenzie, and Yukon systems are used for navigation, but are icebound during much of the year. The Colorado flows for a large part of its course in deep canyons, and is of little use for navigation.

The Rio Grande is a long river with few branches. Many shorter rivers of North America are important because their lower courses are deep enough for ships, and because they supply water, ice, and power to dense populations. Numerous examples are found on the Atlantic Lowland, as the James, Potomac, Susquehanna, Delaware, Hudson, and Connecticut rivers.

Review.—1. Trace the progress of a drop of water from the ocean to the land and back to the ocean. 2. What is the *load* of a stream? 3. What is a gorge and how is it made? 4. What word is used for gorge in the western part of our country? 5. What harm is done by floods? 6. What are the uses of valleys and flood plains? 7. In a stream that winds in sharp curves, where would a swimming hole or a steamer landing be found? 8. What is a delta? A river basin? A divide? 9. Mention several important uses of rivers. 10. Name and locate the great river systems of North America. 11. Which are the most important for navigation?

CLIMATE OF NORTH AMERICA

24. Factors of Climate.—The air about us is a mixture of several gases. It surrounds the whole earth, and extends many miles above the surface. We speak of it as the *atmosphere.* The air at any place may be hot or cold, moist or dry, at rest or in motion. We refer to its heat as the *temperature;* to the moisture, if it falls to the earth, as *rainfall;* and to movements of air that are nearly horizontal, as *winds.* Temperature, rainfall, and the winds are the conditions or factors that make the *climate* of a region.

25. Effect of Latitude.—In the southern part of North America, the sun at midday is always high in the sky, the rays fall directly upon the surface, and the region is hot. Except in the mountains, frosts do not occur.

In much of the United States and southern Canada, the cold and warm seasons are about equal in length. The midday sun is low in the sky in winter and high in summer. In these northern regions, snows cover the ground during much or all of the winter.

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Fig. 30. Winter in northern North America

Brown Brothers

Fig. 31. Winter in southern North America

The Hudson Bay region, the Mackenzie River basin, and Alaska have short summers and long winters. Still farther north, in northern Canada and Greenland, are regions of perpetual frost, ice, and snow.

Thus the temperature of North America changes from the equatorial to the polar regions; that is, it varies with latitude. Low latitudes have in general high temperatures the year round, and high latitudes have low temperatures for most of the year.

Fig. 32. Rocky Mountains, southern Canada, in summer

26. Effect of Altitude.—Not all places in the same latitude, however, have the same climate. The states along the Mississippi River have hot summers. The states along the Rocky Mountains, such as Colorado and Wyoming, in the same latitudes, but situated at high altitudes, have rather cool summers. In like manner the valley of California has a mild climate, while parts of the Sierra Nevada and the Rocky Mountains bear snow and ice throughout the year (Fig. 32). Thus climate becomes cooler as *altitude* increases.

27. Oceanic and Continental Climates.—The waters of the ocean, except in shallow or quiet bays, or in polar regions, never freeze. Ocean water is deep and absorbs much heat from the sun. The land is warmed more quickly than the water in summer, but loses its heat more quickly in winter. Hence the ocean is usually colder than the neighboring lands in the summer and warmer than they are in the winter.

On the west coast of Canada and the United States the prevailing winds are westerly; that is, they blow from the Pacific Ocean. This part of the coast is therefore warmed by the winds from the ocean in the winter and cooled by them in the summer. The climate is even, with no great extremes of heat or cold.

In contrast with the Pacific coast region we may study the northern part of the Mississippi basin. This becomes very warm in the summer. Hot winds blow from the still more heated plains of the southern Mississippi Valley, and there is no bordering ocean from which cooling winds can come. In the winter the ground soon loses the heat absorbed in summer, and the prevailing winds reach the region from the west after passing many hundred miles over the chilled surfaces of mountains and high plateaus. Hence this region has great yearly extremes. Yet it is in the same latitude as much of the Pacific border, which has an even climate. The one has an *oceanic* climate, the other a *continental* climate.

The north Atlantic coast region has a colder climate than the north Pacific coast. The west coast of Canada, with mild winters, is on the north Pacific. Here the prevailing winds come from the ocean and are never very cold. The coast of Labrador, with its bitterly cold winters, is in the same latitude on the north Atlantic. On this shore icy winds come from the cold lands of the interior.

The south Atlantic coast, from Florida to New York, has a milder climate, both because it is farther south and because southerly winds often blow over it from the warm waters of the Caribbean Sea and the Gulf Stream.

28. Summary.—In North America the temperature in the southern part of the continent is tropical, in the central part temperate, and in the northern part Arctic, — due to differences in latitude. It is true, however, that places in the same latitude often differ much in climate because one place is low and another is high, or because one is near the ocean and the other far from it. It is also true that the climate of two places in the same latitude and both on the ocean may differ on account of the direction of the winds and ocean currents. A continental climate is one of extremes, while an oceanic climate is more nearly uniform. As a rule more rain falls near the ocean and less in the interior.

29. Prevailing Winds.—Before leaving our study of the climate of North America, we must learn more about its winds. We have already learned that in much of the United States the more common, or prevailing, winds are from the west (Sec. 27). This is true of nearly the entire temperate belt of the continent. These *prevailing westerly winds* are part of a great system of world winds which are to be taken up later when we come to the study of the ocean.

In the tropical parts of the continent the prevailing winds are from the northeast. They move along the tropical parts of the Atlantic Ocean north of the Equator, cross the West Indies, the Caribbean Sea, and the Gulf of Mexico, and sweep over Mexico and Central America. These are called *trade winds*, and should be fixed firmly in mind because they, like the prevailing westerlies, are parts of the great world winds (Fig. 33).

Fig. 33. Prevailing westerlies and trade winds

U. S. Geological Survey

Fig. 34. Glacier entering the sea, Alaska

Fig. 35. Valley glacier, Alps

Review.—1. What are the factors that make climate? 2. Give examples of places in the same latitude that have different climates. Explain. 3. Why is the ocean warmer in winter and cooler in summer than the lands on its shores? 4. Explain the difference between the climate of Labrador and that of the west Canadian coast. 5. What is the direction of the prevailing winds in the temperate latitudes of North America? 6. What is the direction of the prevailing winds in the West Indies and Central America? What are they called?

GLACIERS

30. Glaciers of the Present Time.—Greenland is the largest of all islands. It is about three times as large as the state of Texas. Nearly seven eighths of its surface, or over 700,000 square miles, are covered with ice. In the past more snow has fallen during the long winters than could melt away during the short summers. Hence the snow has accumulated. Snowflakes consist of crystals of ice, and, when packed together, become solid and blue like other ice. An old snowbank, as seen in the spring, has been packed down, partly melted, and frozen again, and is much like ordinary ice. This has happened on a large scale in Greenland, until most of the island is covered with a thick blanket of ice called an *ice sheet*, or *glacier*.

The ice, brittle as it is, moves slowly out toward the coast, and some of it creeps down the deeper valleys into the sea. There the front masses of ice break off and float away and drift southward through the north Atlantic Ocean as *icebergs*.

It is not easy to understand how ice can move in great sheets or streams, but there is no doubt that it does so. The Greenland ice is, in many places, several thousand feet thick, and moves gently outward to the edge of the island, somewhat as molasses candy spreads out toward the edge of a plate.

In southern Alaska, by the sea, is a range of high mountains, with deep and narrow valleys. Much water vapor comes to them with the mild winds from the Pacific Ocean. This cools and falls as snow on the high slopes of the mountains. The snows pack, creep down the slopes, and form glaciers in the valleys. As in Greenland, some of the glaciers push out into the bays or gulfs of the sea border. In Greenland there is a great central ice sheet with tongues, or streams, reaching out from the edge. In Alaska there are no glaciers except in the mountains, and most of them are narrow streams of ice in mountain valleys.

In high valleys and near the summits of high peaks in western Canada, western United States, and Mexico, small glaciers are found. Hundreds of small glaciers occur in the Alps (Fig. 35) and in the mountains of Scandinavia, and there are many among the high mountains of Asia, Africa, South

America, and New Zealand. Some of the glaciers in Africa and South America are in the equatorial region, showing that if we go high enough, even in the hottest parts of the world, we shall find an Arctic climate.

Most of the Antarctic Continent is buried under an ice sheet much larger than that which covers Greenland. The vast ice mass is always pushing slowly outward into the sea, and the icebergs broken from it are of immense size.

31. Wearing by Glaciers.—Glaciers are heavy because they are hundreds or thousands of feet thick. When they move over the land, even a few inches or a few feet a day, they scrape up loose material and act on the firm rocks as a file or gouge. The stones in the bottom of the ice grind over the rocks, tear them up, or scratch and polish them. We may think of the glacier as a scraper or rude harrow, tearing up earth and rocks and moving them forward. A glacier moving across the hills and valleys of a rugged region will make it smoother. Where a glacier plows

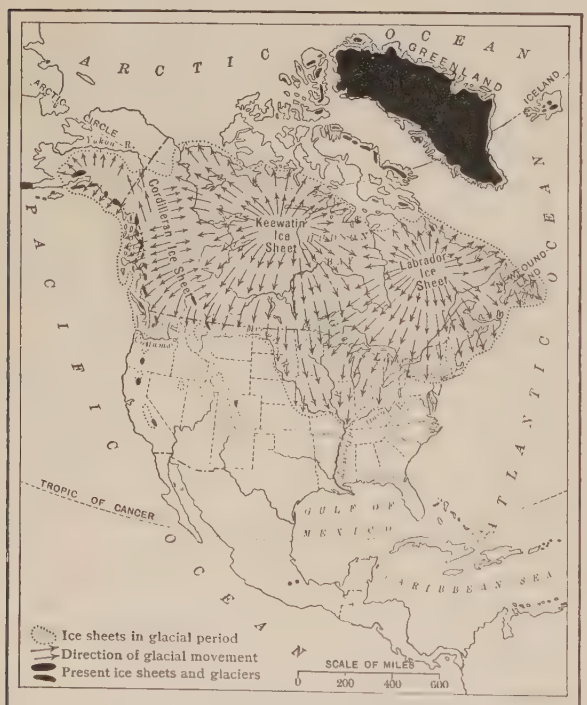

Fig. 36. North American ice sheet

Fig. 37. Moraines

through a valley for a long time, it may scrape out the bottom and make the valley deeper. Sometimes the glacier gouges out the valley floor in places and thus digs basins that are filled by lakes when the glacier melts away.

32. Glacial Period.—In a former period, in most of Canada and northern United States the climate was colder than now, and there was much greater snowfall. Glaciers formed around Hudson Bay, among the highlands of Canada, and also in the mountains of New York and New England. As the snows increased, ice sheets formed and grew larger, until there were great movements southward, southeastward, and southwestward. This *ice invasion* extended as far as the islands south of New England, into northern Pennsylvania, to the Ohio River where Cincinnati now is, and into Kansas and Nebraska (Fig. 36). Much of the northeastern United States was covered by ice for a long time.

The moving mass of ice tore pieces from the rock surface over which it moved, and carried them along or ground them into *rock flour*. Such *land waste* was scattered over wide regions. In some places it covered the land rather evenly, like a sheet or veneer. In other places it was left in irregular hills, knolls, and ridges, making what are called *moraines* (Fig. 37). In certain regions, as in eastern Massachusetts, western New York, and southeastern Wisconsin, there are hundreds of oval hills, called *drumlins*, which got their shape from the glacier's pushing over them.

Fig. 38. Stream flowing from a glacier, Alaska

Water is constantly produced by the melting of glaciers. This water sinks through cracks in the ice and flows out from beneath the glacier at its lower end (Fig. 38). Such water is often white with pulverized rock ground up by the glacier. When an ice sheet spreads over plains, the waters come out at many points along the edge and flow over the land. Many of the prairie plains of the Mississippi basin are covered with sands, clays, and loams brought by such streams from beneath the ancient ice sheet.

Review.—1. What part of North America has a great ice sheet? 2. What are icebergs? 3. What other northern region has many glaciers? 4. What other parts of North America have glaciers?

5. How thick may glaciers be? 6. What effect does their moving have on the ground and rocks beneath?

7. What parts of our continent were formerly invaded by the ice and covered, as much of Greenland is to-day? 8. What deposits were left by the glacier?

DISCOVERY AND SETTLEMENT

33. The Early People of North America.—The Bible and books of Oriental history describe people who lived about the east end of the Mediterranean Sea and along the Nile and Euphrates rivers several thousand years ago. The poets and historians of Greece and Rome tell the story of civilized life in southern Europe, from 2000 to 3000 years ago. Even Great Britain, France, and Germany were visited by civilized men about the time of Christ. But North America had no history of importance, so far as white men are concerned, until 1492, the year of its discovery by Columbus. Norse sailors, indeed, about five hundred years earlier, had come to Greenland by way of Iceland, and made large settlements which lasted several hundred years. It is believed, from their stories, that some of them even discovered the North American mainland, but where they landed is not known.

Columbus, supposing that he had reached the "Indies," or southeastern Asia, called the savages who met him *Indians*. They are often called *red men*, although the real color of their skin is reddish brown. Some of the tribes used red paint on their bodies, and this may explain the name.

As they lived chiefly by hunting and fishing, they required much land to supply food even for a few. North of the Gulf of Mexico, North America was almost an empty continent, waiting for the white man to come and fill it with people. East of the Mississippi River there were perhaps as many Indians as there are people now in the city of Rochester, New York, or in the city of St. Paul, Minnesota.

Through some parts of the forest the Indian made trails, but in the untracked forest he found his way just as well, for he was keen to see and hear, and to remember all that he saw and heard. Before the white man came, he had, in most of our continent, no domestic animal but the dog, hence he traveled afoot when he went out to hunt for food or to engage in war. On streams and lakes, however, he used a light birchbark canoe which he could easily carry across country from the headwaters of one stream to those of another.

Most of the time the Indians in the eastern part of our country lived a settled life in their villages. Like other peoples of the world, they built their homes out of what was near at hand. Some had shelters of brush,

Fig. 39. Indian tents

Fig. 41. Indians decorating pottery

bark, and skins. Some had tents of rush mats supported by poles. Others built houses of wood, often showing much skill; they used posts and rafters, with thatch and siding of split poles and bark. Some of the houses were built 50 or 60 feet long, and were divided into rooms.

The Pueblo tribes of the Southwest, who lived by farming, were more advanced in skill. Because they had little wood, they used bricks of dried mud, or *adobe*. A single *pueblo* held many inhabitants, and was a kind of village, built several stories high, the rooms being reached by ladders (Fig. 40). In Mexico, the Aztecs were a semicivilized people, and built splendid monuments and temples.

In the East most of the Indians cultivated patches of ground near their villages, raising beans, squashes, and especially Indian corn. Wild berries were gathered, and in some parts of the country wild rice, acorns, sunflower seeds, and potatoes were used. Corn and the potato were unknown to the rest of the world before America was discovered, but they have now become important food crops in many other countries.

Wild animals of many kinds were trapped, or killed with bow and arrow, to supply food and clothing. Oysters and clams were found along the shores, and fish were caught in all waters. On the Pacific coast, from Oregon to Alaska, the salmon of the rivers were the chief food of the tribes in that region.

Many Indians had learned more about getting the good things of the earth than we commonly suppose. They made good arrowheads, knives, and hammers of stone, and even quarried the native copper about Lake Superior and hammered it into utensils. They made pottery (Fig. 41), wove garments, blankets, and baskets of many kinds of fibers, and fashioned elaborate ornaments. They had many kinds of dances and games. There

Fig. 40. A pueblo, New Mexico. The doors and windows are modern

were various games of ball; there were contests in throwing and shooting; foot races were common; and "hunt the button" games were played by both men and women. The boys played with tops, slings, and stilts, and the girls played "house" and had dolls of buckskin.

Hominy, *samp*, and *succotash* are names derived from Indian speech. States, cities, islands, lakes, and rivers that the white man has called after Indian names are found in all parts of the continent. The following are examples: Mexico, Ottawa, Connecticut, Manhattan, Chicago, Michigan, Dakota, Wyoming, Spokane, Chattanooga, and Tallahassee. The student may add to this list names from his own region.

34. Spanish Explorers. — Columbus was an Italian, but he sailed under the patronage of the king and queen of Spain. His aim was to find a new route from Spain to southeastern Asia, and he believed he had succeeded when he reached the Bahama Islands and Cuba. He made three later voyages to the same region, and other Spaniards followed him. The result was that Spain took possession of the lands about the Caribbean Sea and the Gulf of Mexico, including Florida, Mexico, Central America, and most of South America (Fig. 42). Spanish explorers and settlers went to the region now occupied by our southwestern states, from Texas to California, and this part of our country still bears many Spanish names. El Paso, Santa Fe, Colorado, Los Angeles, and San Francisco are examples.

Fig. 42. Early divisions of North America

35. French Explorers. — French fishermen began to catch fish near Newfoundland in 1504. French explorers discovered the St. Lawrence River and the Great Lakes. Quebec, the first permanent French settlement, was founded by the explorer Champlain, for whom the lake between the Adirondacks and the Green Mountains is named. The French missionary Father Marquette went from Lake Michigan far down the Mississippi River, and the great explorer and fur trader La Salle followed the river to its mouth. They were two of the many traders and missionaries who went through the forests of Canada and over the prairies of the Mississippi Valley and took possession of the central parts of North America for the French king. Detroit, Duluth, Des Moines, St. Louis, and New Orleans are examples of French names that remain. Many people in Canada and in the city of New Orleans still use the French language.

36. English Explorers. — The first English explorer who came to this continent was John Cabot. He landed on the coast of Nova Scotia or of Labrador. But the great English settlements in America were made more than a century later, on the middle Atlantic coast. The first successful settlement was at Jamestown, in Virginia, in 1607. The *Mayflower* Pilgrims came to Plymouth in 1620. The Dutch took possession of Manhattan Island and named

Fig. 43. A river boundary — the Niagara Gorge

Fig. 44. Boundary marker, Rocky Mountains

the place New Amsterdam; but later they were obliged to give it up to the English, who called it New York.

The English settlers built up thirteen colonies, but they were confined to the narrow Atlantic Lowland (Fig. 42). The French held the St. Lawrence and the great interior lowland. The Spanish held Florida and the Southwest. But the French and Spanish generally cared more for furs and gold than they did to make homes, though many noble French missionaries sought to turn the natives to Christianity. Only the Englishmen came across the sea in large numbers with their families to make homes. They pressed across the mountains, defeated the French in war, and won the central part of North America.

POLITICAL DIVISIONS

In studying the mountains, plains, coast line, rivers, glaciers, or soils, we are dealing with *physical geography*. Look at the map of our continent to see what countries occupy its various parts. The study of the location and extent of countries belongs to *political geography*.

37. The United States. — After England had made its great conquest over the French, the English colonies separated from the mother country as a result of the American Revolution. In 1783 the land was ceded to the United States, from the southern border of Canada to Florida, and from the Atlantic Ocean to the Mississippi River. At length the United States gained Florida and also Texas and other lands west of the Mississippi, until, in 1853, our borders on the Gulf of Mexico and the Pacific were the same as now. In 1867 the United States bought Alaska from Russia, and as a result of the war with Spain in 1898, Porto Rico came into our possession. These are the lands in North America that belong to the United States.

The Atlantic and Pacific oceans are the natural boundaries of the United States on the east and west. On the north the Great Lakes form a natural boundary, but northeastern New York, most of New England, and the border states of the northwest are not separated from Canada by any river, lake, or mountain range. The boundary runs across plains and mountains, mainly in regular lines as fixed by treaty between governments. On the south the Rio Grande in part separates the United States from Mexico.

38. Countries North of the United States. — The Dominion of Canada includes all of the mainland north of the United States, except Alaska, and embraces many islands north of Hudson Bay and lying on the borders of the Arctic Ocean. There are also many small islands bordering the Pacific coast of Canada, and others in the Gulf of St. Lawrence. Canada is the largest country in North America. It is part of the British Empire.

The large island of Newfoundland also belongs to the British Empire, but it is a colony distinct from Canada.

Greenland is under the rule of the kingdom of Denmark.

St. Pierre and Miquelon (Fig. 296), two small islands south of Newfoundland, still belong to France and are important as stations for the French fishermen in those waters. They contain only 93 square miles, have a population of but a few thousand, and are all that is left of the French empire in North America, except a few small islands in the West Indies.

Fig. 45. Statue of Champlain, founder of French America

39. Countries South of the United States.—The republic of Mexico extends from the United States on the north to Central America on the southeast. It includes the peninsula of Lower California, and its southern and narrower part curves to the east and north and embraces the peninsula of Yucatan. It has long shore lines on the Pacific Ocean and on the Gulf of Mexico. Mexico was a Spanish possession for about three hundred years, but became independent in 1821.

Central America is a group of seven small countries. British Honduras is a colony belonging to Great Britain, and the other six countries are republics. Guatemala, Salvador, Honduras, Nicaragua, and Costa Rica gained their independence from Spain about the same time as Mexico. Panama became independent of the South American republic of Colombia in 1903, and at once sold to the United States the right to use forever a strip ten miles wide for the Panama Canal. This is known as the Canal Zone.

The West Indies, like the mainland of North America, are divided among a number of different countries. Cuba has been an independent republic since its release from Spain in 1898. The island of Haiti is divided between the republic of Haiti and the Dominican Republic. Porto Rico belongs to the United States. The Bahamas, Trinidad, Jamaica, and several other islands belong to Great Britain, and other small islands are the property of Holland and of France.

No European nation except Great Britain has important possessions in North America.

Review.—1. How does the white man's stay in North America compare in length of time with the history of older lands? 2. Are *Indians* and *red men* good names for the ancient people of America? 3. What materials did the Indians use for houses? 4. To what extent did the Indians till the soil? 5. What were some of the amusements of the Indians? 6. What names of food do we get from Indian speech? 7. Give examples of Indian names of rivers, states, and cities. 8. Make as full a list of such names as you can from your own state.

9. What was Columbus seeking, in his voyage of 1492? 10. What parts of our continent were occupied by the Spaniards?

11. What first brought the French to the American coast? 12. What parts of the continent did they occupy?

13. Who was the first English explorer to come to America? 14. When was Jamestown settled? 15. How did France lose the great Mississippi Valley? 16. Why were the English successful in winning the continent?

17. When did Spain lose her last possession in North America? 18. What foreign powers have possessions in North America? 19. Name the independent countries of this continent.

Vancouver
Bellingham
Victoria
Everett
Seattle
Tacoma
Olympia
Spokane
Yakima
Mt. Rainier
Portland
Astoria
Columbia R.
Mt. Hood
Walla Walla
Salem
Eugene
Baker
Medford
Crater Lake National Park
Harney L.
Klamath R.
Mt. Shasta
Lassen Peak
Mendocino
Sacramento
San Francisco
Berkeley
Oakland
Reno
Carson City
Ely
Tonopah
Goldfield
Yosemite National Park
Sequoia National Park
Mt. Whitney
Pt. Conception
Pasadena
Los Angeles
San Diego
Prescott
Phoenix
Globe
Tucson
Bisbee
Douglas
Gila R.
Colorado R.
Humboldt R.
Snake R.
Columbia R.
Kootenai R.
Kalispell
Coeur d'Alene
Missoula
Glacier National Park
Anaconda
Butte
Helena
Great Falls
Billings
Miles City
Yellowstone R.
Missouri R.
Boise
Pocatello
Yellowstone National Park
Sheridan
Big Horn R.
Fremont Peak
Rock Springs
Logan
Ogden
Salt Lake City
Provo
Great Salt Lake
Sevier L.
Wasatch Mts.
Green R.
Uinta Mts.
Laramie
Cheyenne
Ft. Collins
Greeley
Boulder
Denver
Leadville
Grand Junction
Colorado Springs
Pikes Peak
Cripple Creek
Pueblo
Arkansas R.
Trinidad
Raton
Santa Fe
Las Vegas
Albuquerque
Roswell
Llano Estacado
Las Cruces
El Paso
Rio Grande
Pecos R.
Canadian R.
Minot
Devils L.
Grand Forks
Red R.
Bismarck
Fargo
James R.
Aberdeen
Watertown
Black Hills
Lead
Pierre
Sioux Falls
Niobrara R.
North Platte R.
South Platte R.
Grand Island
Omaha
Lincoln
Missouri R.
Sioux City
Atchison
Topeka
Kansas R.
Hutchinson
Wichita
Arkansas R.
Enid
Tulsa
Oklahoma City
Muskogee
Red R.
Fort Worth
Dallas
Waco
Brazos R.
Austin
Houston
San Antonio
Laredo
Brownsville
Colorado R.
Gulf of California
Lower California
Pacific Ocean
Mexico
Dominion
L. Manitoba
L. Winnipeg
Winnipeg
Longitude West

Fig. 46
Political
UNITED STATES
Capitals of Countries thus: ◎
Capitals of States thus: ⊙
Scale of Statute Miles
0 50 100 200 300
252 MILES TO ONE INCH.
COPYRIGHT, BY AMERICAN BOOK COMPANY
THE MATTHEWS-NORTHRUP WORKS, BUFFALO, N. Y.
CANADA
GULF OF MEXICO
ATLANTIC OCEAN
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
Lake Ontario
Lake Okeechobee
Tropic of Cancer
Florida Strait
BAHAMA ISLANDS
CUBA
Minnesota
Wisconsin
Michigan
Iowa
Illinois
Indiana
Ohio
Pennsylvania
New York
Maine
Vermont
New Hampshire
Massachusetts
Rhode Island
Connecticut
New Jersey
Delaware
Maryland
West Virginia
Virginia
Kentucky
Tennessee
North Carolina
South Carolina
Georgia
Alabama
Mississippi
Louisiana
Arkansas
Missouri
Florida
Duluth
Superior
Minneapolis
St. Paul
Winona
Madison
Milwaukee
Racine
Oshkosh
Grand Rapids
Saginaw
Bay City
Flint
Detroit
Lansing
Toronto
Hamilton
Buffalo
Rochester
Albany
Troy
Utica
Syracuse
Binghamton
Boston
Worcester
Providence
Hartford
New Haven
Portland
Bangor
Augusta
Montreal
Quebec
Ottawa
Chicago
Rockford
Dubuque
Cedar Rapids
Davenport
Council Bluffs
Des Moines
South Bend
Ft. Wayne
Toledo
Cleveland
Youngstown
Akron
Erie
Scranton
Wilkes-Barre
Jersey City
Newark
New York
Trenton
Reading
Pittsburgh
Harrisburg
Philadelphia
Wilmington
Dover
Baltimore
Washington
Annapolis
Peoria
Springfield
Indianapolis
Terre Haute
Dayton
Columbus
Wheeling
Cincinnati
Covington
Frankfort
Lexington
Charleston
Roanoke
Richmond
Norfolk
St. Joseph
Leavenworth
Kansas City
Jefferson City
St. Louis
East St. Louis
Evansville
Louisville
Cairo
Pittsburg
Springfield
Joplin
Nashville
Knoxville
Asheville
Charlotte
Raleigh
Winston-Salem
Wilmington
Fort Smith
Memphis
Chattanooga
Little Rock
Hot Springs
Pine Bluff
Columbia
Atlanta
Augusta
Birmingham
Macon
Savannah
Charleston
Meridian
Montgomery
Shreveport
Jackson
Vicksburg
Natchez
Mobile
Pensacola
Tallahassee
Jacksonville
St. Augustine
Beaumont
Baton Rouge
New Orleans
Galveston
Tampa
Tampa Bay
Key West
Havana
Nassau
Delta of the Mississippi R.
C. San Blas
C. Sable
C. Hatteras
C. Fear
Mt. Katahdin
Bay of Fundy
St. Lawrence R.
Ottawa R.
Red R.
Rainy R.
Rainy L.
Lake of the Woods
L. Nipigon
St. Marys River and Canal
Sault Ste. Marie
Georgian Bay
Saginaw Bay
St. Clair R.
Welland Canal
Niagara R.
Hudson R.
Mohawk R.
Adirondack Mts.
White Mts.
Green Mts.
Long I.
Nantucket I.
Martha's Vineyard
C. Cod
Delaware Bay
Chesapeake Bay
Potomac R.
James R.
Roanoke R.
Pamlico Sd.
Albemarle Sd.
Mississippi R.
Ohio R.
Missouri R.
Illinois R.
Tennessee R.
Cumberland R.
Red R.
Sabine R.
Pearl R.
Alabama R.
Tombigbee R.
Chattahoochee R.
Savannah R.
St. Johns R.
Mt. Mitchell
Lake Champlain
Lake George
Hudson R.
Mohawk R.
Susquehanna R.
Delaware R.
Schuylkill R.
Potomac R.
Rappahannock

THE UNITED STATES

Map Study (Fig. 46).—1. How many degrees of longitude are covered by the United States? How many degrees of latitude? 2. What rivers and lakes form part of the northern boundary of the United States? 3. What parallel of latitude does part of this boundary follow? 4. Describe the boundary between this country and Mexico.

5. Which is the longer, the Atlantic or the Pacific coast line of the United States? 6. What states touch the Pacific Ocean? 7. Between what states is Delaware Bay? In what states is Chesapeake Bay? In what state is San Francisco Bay? 8. How do the Atlantic and Pacific coast lines differ?

9. Make a list of the states that touch the Ohio River or some of its branches. 10. Is any state drained wholly by the Ohio River system? 11. What rivers flow into the Mississippi from the east? From the west? 12. What river systems share in the drainage of Minnesota? 13. What important branches has the Missouri River? 14. Describe the course of the Arkansas River.

15. Name a river and a lake that have no outlet to the ocean. 16. Describe the course of the Columbia River. 17. What great rivers have some of their headwaters in Colorado? 18. What states touch one or more of the Great Lakes?

Fig. 47. Relief shown by hachures

WAYS OF SHOWING THE FORMS OF THE LAND

40. Relief.—The term *relief* is used in geography to mean the elevations and depressions of the land surface. To show the relief is to represent the plains, slopes, mountains, peaks, and valleys as they are in nature. We may do this by pictures, but a picture can include only a small region. We may do it by models made of paper, plaster, sand, or clay, but the most convenient way is by maps. In these we can show a river basin, a state, a country, or a continent on a single page. If the map has a scale, we can learn from it the size of the region shown.

There are four common ways of showing the forms or relief of the land on a map; these are illustrated by maps of parts of the United States in Figures 47, 48, 51–57, and 58.

41. Showing Relief by Hachures.—The first is by the use of short, nearly parallel lines called *hachures* (Fig. 47). In order to represent heights, such as mountains, or the border slopes of a plateau, hachures are so drawn as to give the effect of shading. Thus the map shows where the Sierra Nevada and the Coast Ranges are, and in what directions they trend, but does not tell *how high* they are.

42. Showing Relief by Shading.—The second method of showing relief is by *shading* (Fig. 48). The effect of such a map is like that of shadows cast by the higher lands, and the map gives a kind of bird's-eye view of the forms of the region or country.

43. Showing Relief by Contours.—The third method is by *contours*. In this method a system of lines is used, and all points on any one line have the same altitude. If the student will start at any point on the side of some hill that stands out by itself and walk around the hill, never going up or down, but keeping his feet always at the same level, it will help him to understand the meaning of a contour.

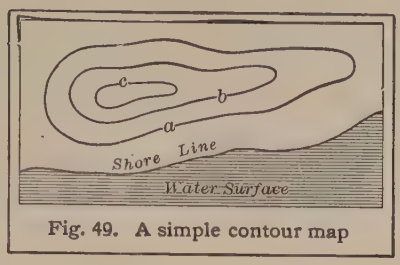

Fig. 49. A simple contour map

If the hill is near the sea (or near a lake or large pond), it will be easy to find a point on its side that is 20 feet higher than the water level. Beginning at this point, walk around the hill as above directed. Your path will be a contour line of 20 feet (Fig. 49, line *a*).

Then climb the slope until you are 40 feet above the water and walk around again to the second starting point. This is the contour line of 40 feet (line *b*). Every point on this line is 40 feet above sea level. All points between line *a* and line *b* are between 20 and 40 feet in altitude.

Go up 20 feet more, and walk around, and you will trace the 60-foot contour. If the hill is but 70 feet high, you cannot go up another 20 feet. The map (Fig. 49) shows that the hill is more than 60, and less than 80 feet high.

Study now Figure 50. It shows a shore line and a hill drawn on the same scale as before. The hill is longer than the other. It is not only wider, but much wider at one end than at the other end. Notice also that the wider end is higher than the other. It requires six lines to represent the higher end. The hill at the wide end is therefore more than 120 feet, but less than 140 feet high. At the narrow end the height is more than 80, but less than 100 feet. The low place between the summits is between 60 and 80 feet high. The map also shows that the wide end of the hill has a steeper slope on the side toward the water than on the side away from it.

Fig. 48. Relief shown by shading

Fig. 50. Profile view and contour map

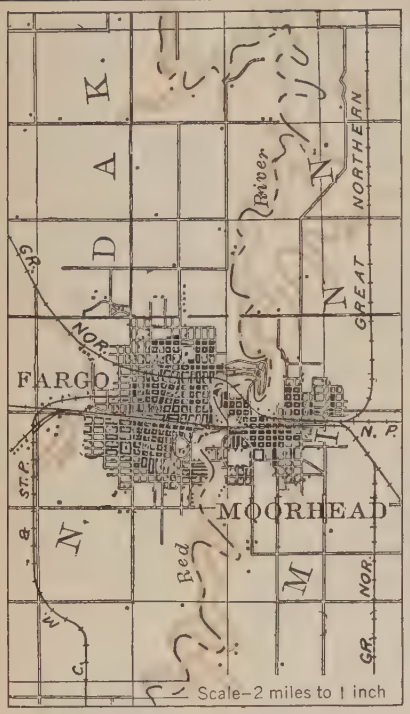

Fig. 51. A flat plain — part of the basin of the Red River

Fig. 52. Drumlins, — oval hills composed of glacial waste, — New York

Fig. 53. Land made rough by the work of streams, Virginia

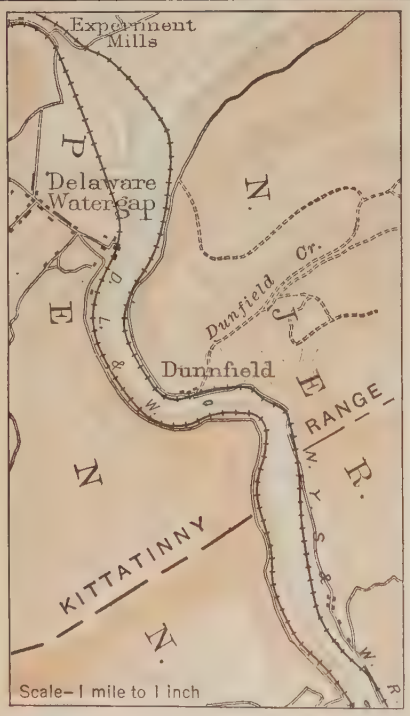

Fig. 54. Water gap cut across a mountain range by the Delaware River

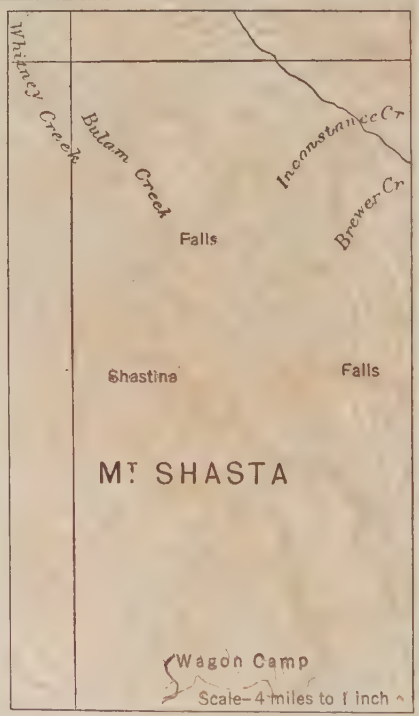

Fig. 55. Mt. Shasta, California, a volcanic mountain peak (see Fig. 69)

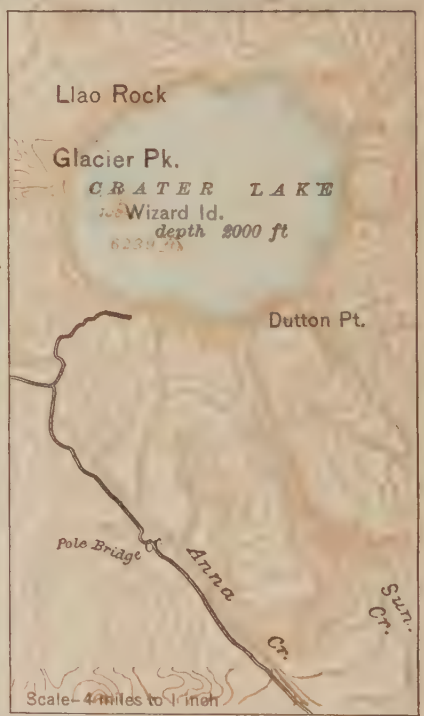

Fig. 56. Crater Lake, Oregon, in an extinct volcano (see Fig. 265)

It is plain that the contour map gives us more definite information about a region than we get from the hachures or from the shading.

In the maps already described the *contour interval* is *20 feet.* We might use a contour interval of 5, 10, 50, 100, 500, or 1000 feet as well as of 20 feet. The choice depends on the nature of the country and the scale of the map; a 500 or 1000 foot interval is about as small as can be used on the large maps in this book. If the region shown is almost flat, we must use a small interval to show its shape. If we wish to show very high mountains with steep slopes, we can represent their general shape with contours 500 or 1000 feet apart. In Figure 57 the contour interval is 1000 feet.

Figures 51–56 are copied from maps published by the government through the Geological Survey at Washington. Such maps have already been made for many parts of our country and will ultimately be made for all parts. These maps are sold by the government for a small price. Find out if the map for the region in which you live has been published.

Fig. 57. Relief shown by contours. Compare with Figs. 47 and 48, of the same region

The following statements apply to all these maps. All water is shown in blue. This applies to the ocean, to lakes, ponds, rivers, and canals. Every feature due to man, except canals and artificial ponds, is shown in black. This applies to roads, towns, tunnels, bridges, boundary lines, wharves, lighthouses, and many other things. The contour lines are in brown. The maps chosen here show different kinds of country, varying from flat to hilly and mountainous.

44. Showing Relief by Colors.—A fourth way of showing relief is by the use of *colors* (Fig. 58). Lands of a certain range of altitude are shown by a single color. Thus in the map of the United States every area whose surface is between sea level and 500 feet is shown in dark green. It is common to use green shades for the lower lands and brown or red for the higher. This method does not show particular heights except on the line where one color borders another. Such a map is a variety of the contour map.

SURFACE FEATURES

45. The Formation of Rock Layers.—If we visit a sand or clay pit, which has been opened for the purpose of making mortar or brick, we find that the material lies in layers or beds. If we wait until the water has dried away from a pool after a storm, and dig up the mud at the bottom, we find it also in the form of one or more layers. In the same way, on the bottom of every lake, and of the ocean, muds are accumulating. They are made of the land waste that the rivers bring in. Layers of mud are always forming on the bottom of the Gulf of Mexico, for example, on account of the earthy matter brought in by the Mississippi River and other streams. Near the mouth of the Mississippi River, in the region of the delta, the muds accumulate very rapidly.

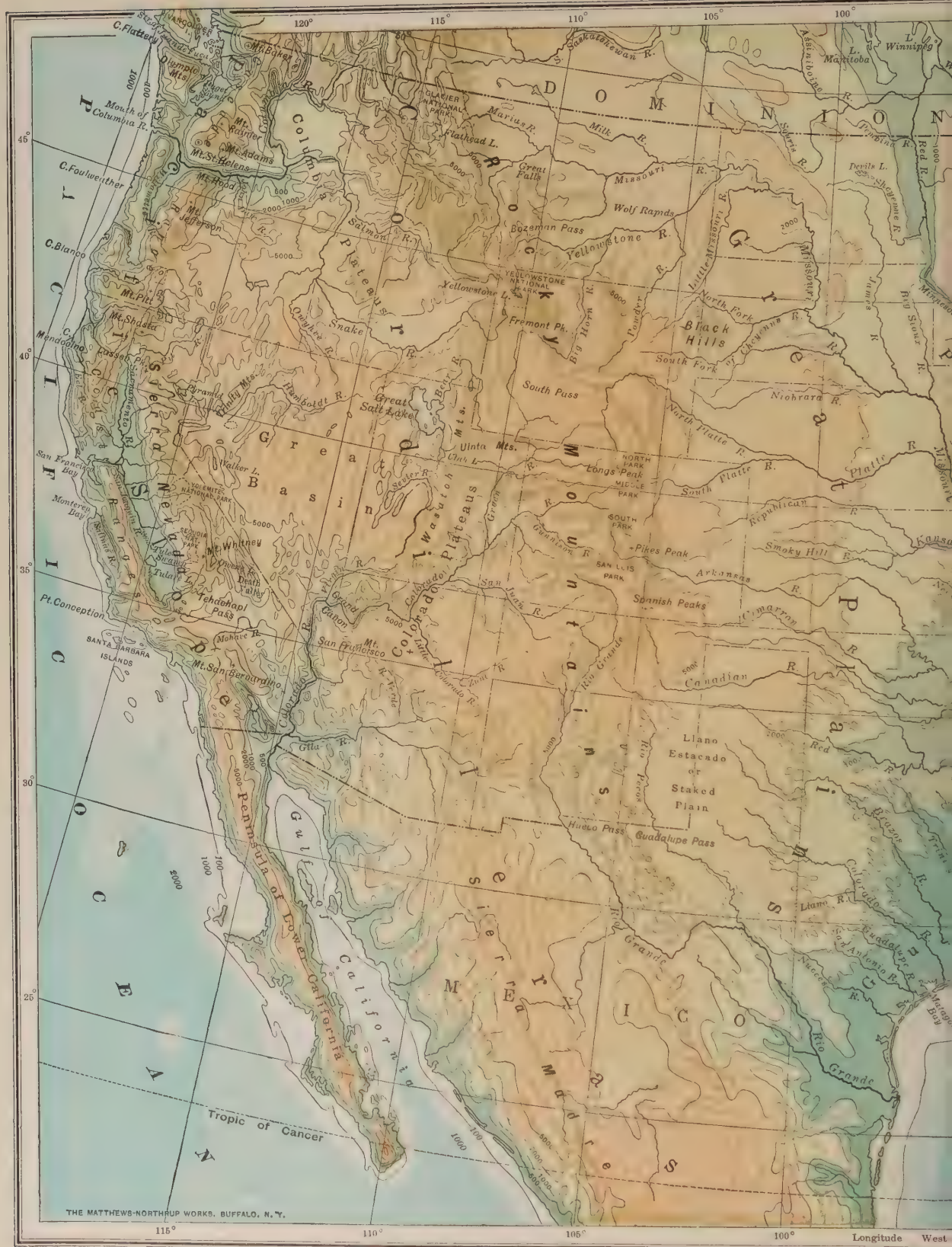
DOMINION
Rocky Mts.
Great Plains
Great Basin
Colorado Plateaus
Wasatch Mts.
Sierra Nevada
Cascade Range
Coast Ranges
Pacific Ocean
Gulf of California
Peninsula of Lower California
Sierra Madre
Mexico
Columbia R.
Snake R.
Yellowstone R.
Missouri R.
Colorado R.
Rio Grande
Great Salt Lake
Yellowstone L.
Flathead L.
Lake Winnipeg
Lake Manitoba
Mt. Baker
Mt. Rainier
Mt. Adams
Mt. St. Helens
Mt. Hood
Mt. Jefferson
Mt. Shasta
Mt. Whitney
Death Valley
Pikes Peak
Spanish Peaks
Wolf Rapids
Great Falls
Bozeman Pass
Fremont Pk.
South Pass
Uinta Mts.
Longs Peak
Black Hills
Llano Estacado or Staked Plain
Guadalupe Pass
Hueco Pass
Tehachapi Pass
Mt. San Bernardino
Mt. San Jacinto
Mt. San Francisco
Grand Canon
Yellowstone Park
Glacier National Park
Yosemite National Park
Sequoia National Park
Rocky Mountain Park
Mesa Verde National Park
Mouth of Columbia R.
C. Flattery
C. Blanco
C. Mendocino
Pt. Conception
San Francisco Bay
Monterey Bay
Santa Barbara Islands
Tropic of Cancer
THE MATTHEWS-NORTHRUP WORKS, BUFFALO, N. Y.
Longitude West

Fig. 58
Physical
UNITED STATES
Scale of Statute Miles
0 50 100 200 300
252 MILES TO ONE INCH
ELEVATIONS IN FEET. Depths in Fathoms.
OVER 5000
2000 TO 5000
1000 TO 2000
500 TO 1000
SEA LEVEL TO 500
LAND BELOW SEA LEVEL
0 to 100
100 to 1000
1000 to 2000
over 2000
COPYRIGHT, BY AMERICAN BOOK COMPANY
CANADA
GULF OF MEXICO
ATLANTIC OCEAN
BAHAMA ISLANDS
CUBA
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
L. Ontario
Gulf of St. Lawrence
Bay of Fundy
Peninsula of Nova Scotia
Penobscot Bay
Casco Bay
C. Ann
Massachusetts Bay
C. Cod
NANTUCKET I.
Narragansett Bay
Montauk Pt.
New York Bay
C. May
Delaware Bay
Henlopen
C. Charles
C. Henry
Pamlico Sound
C. Hatteras
C. Lookout
C. Fear
Port Royal Entrance
C. Canaveral
Tampa Bay
Florida
Everglades
C. Sable
FLORIDA KEYS
GREAT BAHAMA BANK
Mouths of the Mississippi R.
Galveston Bay
Atchafalaya Bay
C. San Blas
Apalachee Bay
Mobile Bay
Ozark Plateau
Iron Mt.
Pilot Knob
Prairies
Plains
Appalachian Mts.
Blue Ridge
Cumberland Mts.
Great Smoky Mts.
Mt. Mitchell
Piedmont Plateau
Coastal Plain
Alleghany Plateau
Catskill Mts.
Adirondack Mts.
White Mts.
Berkshire Hills
Green Mts.
Hoosac Mts.
Taconic Mts.
Palisades
Ohio R.
Mississippi R.
Missouri R.
Rio Grande
Red R.
Arkansas R.
Tennessee R.
Cumberland R.
Kanawha R.
Monongahela R.
Allegheny R.
Susquehanna R.
Potomac R.
James R.
Roanoke R.
Pee Dee R.
Santee R.
Savannah R.
Altamaha R.
St. Johns R.
Connecticut R.
Hudson R.
Mohawk R.
St. Lawrence R.
Niagara Falls
Falls of St. Mary R.
Detroit R.
St. Clair R.
Lake of the Woods
L. Nipigon
Rainy L.
Rainy R.
Isle Royal
L. Itasca
Mississippi R.
Minnesota R.
Des Moines R.
Iowa R.
Cedar R.
Rock R.
Illinois R.
Wisconsin R.
Chippewa R.
St. Croix R.
L. Pepin
Fox R.
Kankakee R.
Peoria L.
Sangamon R.
Wabash R.
White R.
Kaskaskia R.
Missouri R.
Osage R.
Green R.
Cumberland R.
Tennessee R.
Shoals
Arkansas
Red R.
Ouachita R.
Sabine R.
Sabine L.
Pearl R.
Alabama R.
Tombigbee R.
Pascagoula R.
Lake Pontchartrain
Yazoo R.
Big Black R.
Warrior R.
Tallahatchie R.
Chattahoochee R.
Flint R.
Ocmulgee R.
Oconee R.
Savannah R.
Pedee R.
Santee R.
Cape Fear R.
Neuse R.
Roanoke R.
James R.
Potomac R.
Susquehanna R.
Delaware R.
Hudson R.
Connecticut R.
Merrimac R.
Kennebec R.
Androscoggin R.
St. John R.
Penobscot R.
Saco R.
Piscataqua R.
Housatonic R.
Thames R.
Connecticut R.
Genesee R.
Oswego R.
Black R.
Grand R.
Muskegon R.
Manistee R.
Manistique R.
Menominee R.
Escanaba R.
Ontonagon R.
Montreal R.
Pigeon R.
Kaministiquia R.
Winnipeg R.
Lake of the Woods
L. Nipigon
Rainy L.
Rainy R.
Isle Royal
L. Itasca
Mississippi R.
Minnesota R.
Des Moines R.
Iowa R.
Cedar R.
Rock R.
Illinois R.
Wisconsin R.
Chippewa R.
St. Croix R.
L. Pepin
Fox R.
Kankakee R.
Peoria L.
Sangamon R.
Wabash R.
White R.
Kaskaskia R.
Missouri R.
Osage R.
Green R.
Cumberland R.
Tennessee R.
Shoals
Arkansas
Red R.
Ouachita R.
Sabine R.
Sabine L.
Pearl R.
Alabama R.
Tombigbee R.
Pascagoula R.
Lake Pontchartrain
Yazoo R.
Big Black R.
Warrior R.
Tallahatchie R.
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Oconee R.
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Cape Fear R.
Neuse R.
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Susquehanna R.
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Kennebec R.
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St. John R.
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Housatonic R.
Thames R.
Connecticut R.
Genesee R.
Oswego R.
Black R.
Grand R.
Muskegon R.
Manistee R.
Manistique R.
Menominee R.
Escanaba R.
Ontonagon R.
Montreal R.
Pigeon R.
Kaministiquia R.
Winnipeg R.
95° from Greenwich
90°
85°
80°
75°
70°
65°
50°
45°
40°
35°
30°
25°

Some of the finer matter carried by the Mississippi is moved out to sea hundreds of miles before it settles to the bottom. If the sands of the sand bank, the clays of the clay pit, or the muds of the pool or ocean were hardened, they would make rocks.

The large flat stones often used in making sidewalks were once parts of beds of mud that were in time hardened into rock. The blocks in the walls of many stone buildings are parts of beds of ancient rock. In many quarries the rocks are in horizontal layers. They may be a few inches in thickness, or several feet. Such rocks were once beds of mud or sand, laid down in seas which no longer exist. The particles of clay or sand have been bound firmly together by various substances which serve as a cement.

Fig. 59. Rock beds that are nearly horizontal

Fig. 60. Folded rock layers

The rocks that underlie the surface of the United States are mainly of this kind (Fig. 59). When we dig down through the soil or stony clay, or other loose material, we find firm rock. Sometimes the rock is near the surface, and sometimes it requires a deep well or mine shaft to reach it. The thickness of the rock layers, taken all together, is often many thousand feet.

In many regions the rock layers are nearly or quite horizontal. This is true in the Atlantic coastal plain, from New Jersey southward to Florida. It is also true in the greater part of the Mississippi basin.

46. Folded Rocks.—If the student will lay several sheets of paper or cloth together and push them inward from opposite sides, the paper or cloth will wrinkle or fold. Some of the folds will turn up and some will turn down. In many mountain regions something like this on a large scale has happened to the rocks. They were once nearly horizontal, but the earth has shrunk a little, and the rock beds have been wrinkled or folded in places, somewhat as the skin of an apple wrinkles or shrivels when the apple is baked. They have been pushed and crumpled, and the sidewise pushing has made the rocks rise in some folds and sink in others (Fig. 60).

It seems as strange that brittle rocks will bend as it does that the brittle ice in glaciers will move, but both are true. The folding of rocks, however, is sometimes so great that they are broken and crushed. Many mountains are formed of folded or broken rock layers, carved and worn by the work of streams and glaciers.

47. The Atlantic Lowland.—The lowland between the Atlantic Ocean and the Appalachian Mountains varies greatly in character in different parts. South of New York, the

Fig. 61. Atlantic coastal plain in North Carolina. The ditches are in a rice field

belt of lowland bordering the ocean is known as the *Atlantic coastal plain*. It is nowhere more than a few hundred feet above sea level, and slopes gently to the shore of the sea. It is so nearly flat (Fig. 61) that the rivers flow sluggishly, and railroads run from New York, Philadelphia, and Baltimore to Florida almost on a level. The rock layers not only lie nearly horizontal, but many of them are loose and soft, somewhat like the muds and sands of the seashore. In them are found shells that are much like those found on the seashore.

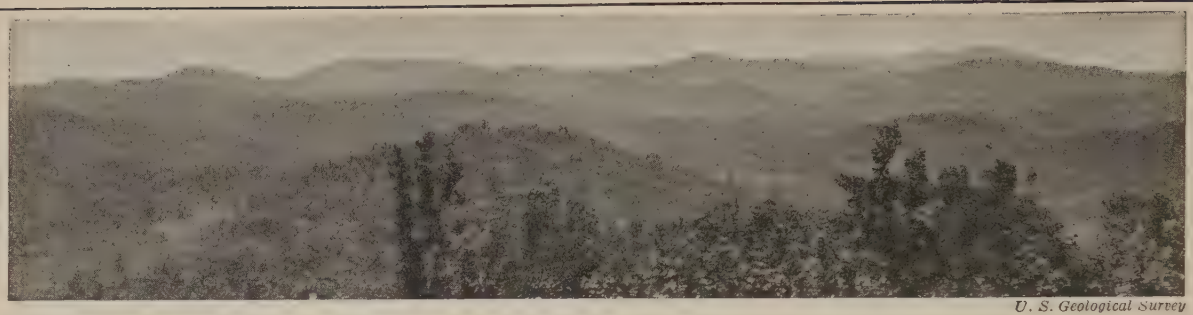
These facts show clearly that these lands were at one time a part of the sea bottom and that they have slowly risen above the sea. When free from water, the surface was soon covered with grasses and forest and was crossed by rivers flowing from the higher lands on the west. The rocks of the higher lands are harder and older than those of the coastal plain, and the streams have cut into them more slowly.

Where a river flows from the harder, higher lands to the western edge of the belt of soft rocks, there is usually a rapid or a waterfall. There is such a waterfall in the Potomac River above Washington (Fig. 62), and there is such a rapid in the James River at Richmond (Fig. 63). The line marking the boundary between the higher lands and the western edge of the coastal plain, where these and other rivers have falls and rapids, is called the *Fall Line*. There is water power where the rivers cross the line. On the seaward side of the Fall Line some of the rivers are deep enough for navigation. For these reasons many cities, such as Richmond, Columbia, and Macon, have grown up, and are known as the cities of the Fall Line.

The tides of the ocean flow far up these rivers, and hence the coastal plain is often

Fig. 62. Waterfall in the Potomac River

Fig. 63. Rapids in the James River at Richmond



U. S. Geological Survey

Fig. 64. Blue Ridge, North Carolina. These mountains are covered with forests

called the *Tidewater country*. In early days, when ocean ships were small, the farmer by such a river often had his own wharf, and the ships came up, took his crop of tobacco on board, and carried it across the sea to be sold in London.

East and north of the city of New York, along the coast of New England, there is a lowland also, but it is in many places rough, hilly, and rocky, and the beds of rock lie at almost every angle. The hills were once much higher than they are now, and have been worn away until they are nearly as low as the coastal plain south of New York, but the region is much less even and smooth.

Between the coastal plain and the Appalachian Mountains is a hilly region much like the lowland of New England. From New York to Maryland, this region of harder and older rocks is low and rather narrow; farther south it becomes a wide, rolling upland. It is often called the *Piedmont* (foot of the mountain) *Plateau*.

48. **Appalachian Mountains.**—The Appalachian Mountains (Sec. 14) are made up of folded rock layers, unevenly worn away. Several groups of these mountains have special or local names. In New Hampshire there is a group of peaks called the White Mountains. In Vermont are the Green Mountains. They extend southward across Massachusetts into Connecticut as the Berkshire Hills. In New York are the Adirondacks and the Highlands of the Hudson, the latter continuing into New Jersey. In Pennsylvania, north of Harrisburg and Reading, is the Blue Mountain, a long, high ridge running northeast and southwest. Parallel to it on the northwest are several other ridges, all belonging to the Appalachians.

In the southern states, the highest part of the Appalachians is the Blue Ridge (Fig. 64). It crosses Maryland and Virginia, and in North Carolina grows higher and broadens into a great series of ridges and peaks, known generally on the eastern side as the Blue Ridge, but often in Tennessee as the Great Smoky Mountains.

West of the Blue Ridge in Virginia, Kentucky, and Tennessee are other long mountain ridges and valleys, all belonging to the same system. One very wide and important valley is called the *Great Appalachian Valley*. It extends through Maryland, Virginia, eastern Tennessee, and northern Alabama. In Virginia, the Shenandoah and the upper parts of the James River and other rivers flow through this valley; in Tennessee, the Tennessee River. In this valley are many beautiful farms, long lines of railroad, and important cities, including Knoxville and Chattanooga in Tennessee, and Birmingham in Alabama.

The Appalachian Mountains vary from less than 2000 feet to a little over a mile in altitude. They are low as compared with the Rocky Mountains or with the Alps, and are for the most part covered with forest. Only a few of the peaks are rocky; they have no glaciers and no snows that remain through the summer.

49. Appalachian Plateau.—West of the mountains is another highland, about as high as the mountains, but made in a different way. The rock layers were not folded, but have been lifted high above the sea and left flat. Originally the surface was nearly level, but the streams have carved it into a region of hills and deep valleys (Fig. 65).

This upland or plateau bears different names in different states. In New York it includes the Catskills, and extends to Lake Erie. In Pennsylvania it is called the Allegheny Plateau, and in Kentucky and Tennessee it is called the Cumberland Plateau. The plateau slopes to the north and west through Ohio and Kentucky. On the north it leads down to the flat ground along the Great Lakes. On the west it descends to the uplands of southern Indiana and the prairie plains in Illinois and other states along the Mississippi River. Most of the plateau is drained by the Ohio River and its branches.

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Fig. 65. Valley in the Appalachian Plateau

50. The Great Lakes and the Lake Plains.—The Great Lakes are five in number. Four form part of the boundary between the United States and Canada, and one, Lake Michigan, is wholly within the United States. They all belong to the St. Lawrence River system. In their deepest parts they vary from about 200 to 1000 feet deep. Their water is warmed by the sun during the summer. The heat is slowly given off during the autumn and winter and relieves the severity of the climate about the lakes. These lakes are so large, and reach so far into the interior of a fertile country, that they are great highways of commerce, and many cities have grown up on their shores. Around Lake Superior is a rugged upland with much forest and many mines of iron and copper, but all the other lakes are surrounded by flat or rolling lands which are fertile and produce rich crops of grain and fruit.

The St. Marys River, leading from Lake Superior to Lake Huron, descends about 20 feet in rapids. Around these, both the United States and Canada have made canals with locks to carry large ships from one lake to the other. The Niagara River flows from Lake Erie to Lake Ontario, and here are the Niagara Falls, well known in all lands for their grandeur. Ships passing between the two lakes make use of the Welland Canal. There are rapids also in the St. Lawrence River between Lake Ontario and tidewater at Montreal. At these places other canals have been dug, so that ships of good size can pass from Lake Superior to the Atlantic Ocean.

51. Plains of the Mississippi Valley.—Westward from the Great Lake region and the Appalachian Plateau are wide lowlands lying on both sides of the Mississippi River. They are very gently rolling, and nowhere more than a few hundred feet above the level of the sea. Much of the region is called *prairie*, from a French word meaning "meadow,"—that is, open grassland, with little forest. When the white man first saw the country, thousands of square miles were covered with tall grasses and other wild plants. The decaying roots and tops of these plants had been gathering on the ground and below the surface for a very long time. As a result, the soil was a black loam, in some places more than ten feet deep. In most regions, however, this layer of dark-colored soil does not extend much below the furrow made by the plow. The surface soil was filled with a tangle of

Fig. 66. A windbreak on a prairie farm, Nebraska

weeds and was hard to break up at first. But when once subdued, the soil was found to be very fertile and has since produced large crops of grain. In the early days fierce prairie fires sometimes ran over these grasslands with the speed of the wind, burning the thick carpet of dried grasses and weeds.

The prairies are not entirely without forests, for woodlands are found along the bluffs bordering the shallow valleys. Now that many people live on the prairies, trees have been planted along the roads and in the towns for shade and windbreaks (Fig. 66), so that, with houses, cultivated fields, roads, and trees, the country has a different appearance from that of one hundred years ago.

Illinois and Iowa are the great prairie states, and the prairies reach northward into Wisconsin and Minnesota, and southward into Kentucky and Missouri.

Southern Missouri and northern Arkansas are uplands, known as the *Ozark Plateau*, and there are mountain ridges south of the Arkansas River.

Farther to the south are plains again, stretching along the Gulf of Mexico from Texas to Florida. They include the delta of the Mississippi. Excepting the delta, they are like the Atlantic coastal plain from New Jersey to Florida, and are known as the *Gulf Plains*. Parts of these plains drain into the Mississippi River, and other parts into smaller rivers flowing to the Gulf of Mexico.

The prairies, that is, the open grasslands, reach westward into the Dakotas, Nebraska, Kansas, Oklahoma, and Texas. Toward the west the rainfall is less and the prairie merges into a drier region called the *Great Plains*. The Great Plains slope smoothly and gently upward to the foot of the Rocky Mountains, in Montana, Wyoming, Colorado, and New Mexico (Fig. 67). In these states the plains are about a mile above the sea, but the ascent from the Mississippi River is made so gradually that the traveler on the railway does not notice it. Thus there is a vast plain slightly inclined from west to east (Fig. 17).

A cluster of mountains rising out of the Great Plains in South Dakota and Wyoming is known as the Black Hills.

52. Cordilleran Region, or Western Highlands.—The eastern part of the Cordilleran region is the Rocky Mountain system. It consists of many ranges and peaks and extends from New Mexico through Colorado, Wyoming, and Montana. It thus crosses the country from the southern part toward the northwest, and continues northward into Canada, where it is called the Canadian Rockies. The higher peaks and ridges are from 10,000 to 14,000 feet in altitude. Hence they rise as much as 8000 feet above the Great Plains on the east.

Fig. 67. Threshing wheat on the Great Plains, Colorado

In these mountains trees do not grow at a greater altitude than about 10,000 feet. Above this height the slopes and tops are either of bare rock, or are covered with rock waste which bears grasses or alpine flowers. The belt along the slopes where the trees thin out and finally cease is known in these and all mountains as the *timber line* (Fig. 68). In warmer regions the timber line may be higher than 10,000 feet, and in colder lands it is lower.

Between the ridges of the Rocky Mountains in Colorado, at altitudes of 7000 or 8000 feet, are wide basins of grassland. They are good for pasturage in the summer, but are too high and cold for agriculture. Although they have few trees, these basins, bordered by mountains, are called *parks*.

Many great rivers have their sources in the Rocky Mountains. Flowing to the east and south are the Missouri and Arkansas rivers and the Rio Grande. On the west are the Snake River and several branches of the Colorado River.

53. Plateaus.—West of the Rocky Mountains are vast plateaus, or table-lands, from 2000 to 10,000 feet in altitude.

In southern Idaho and eastern Oregon and Washington are the plateaus of the Snake and the Columbia rivers. They are mainly fields of lava poured out in former ages and spread widely over the country. Most of the active volcanoes of the present time build up mountains, or *cones*, of the lava and fragments of rock which come up through their craters. But in former periods great floods of very liquid lava sometimes rose through many openings or through long cracks in the earth. Most of the lavas of these plateaus originated in this way, and in some places they are as much as 4000 feet thick. They break up into a very fertile soil. The Snake River has cut deep canyons through the southern parts of these plateaus. Since the Snake River is a part of the Columbia river system, the entire region is often called the *Columbia Plateaus*.

Fig. 68. Timber line in the Rocky Mountains

To the south are the *Colorado Plateaus*. They are the lands drained by the Colorado River and its branches. They lie in western Colorado and New Mexico, in eastern Utah, and in Arizona. Both the Colorado and its tributaries have cut deep gorges into the plateau. The greatest of these is the Grand Canyon of the Colorado, in northern Arizona, 200 miles long and in some parts more than a mile deep. It is one of the most wonderful natural features of the world.

54. Great Basin.—West of the Colorado Plateaus is the lofty range of the Wasatch Mountains, running north and south through Utah. At the western base of the Wasatch range is the Great Basin, which includes western Utah, nearly all of Nevada, and small parts of other states. It is called the Great Basin because it is bordered on the east and on the west by high mountains, and because its rivers do not reach the sea.

Streams from the Wasatch Mountains discharge into Great Salt Lake. This lake has no outlet. Evaporation from its surface removes as much water as the rivers bring.

The streams flowing into the lake bring with them salts and other substances dissolved from the rocks, and these are left as the water is evaporated. Hence the water of Great Salt Lake is a brine, so dense and heavy that a person cannot sink in it. Similar conditions exist in the Dead Sea of Palestine and in many other lakes in dry regions.

55. Pacific Ranges.—West of the Great Basin is the lofty mountain range called Sierra Nevada, and west of the lava plateaus of the Columbia River is the Cascade Range. Rising above the wooded parts of the Cascade Range are several high volcanic peaks. Among them are Mt. Baker, Mt. Rainier, Mt. St. Helens, Mt. Adams, and Mt. Hood. Mt. Shasta is another great volcanic peak, close to the Sierra Nevada, in northern California (Fig. 69). Several of the volcanic cones, and parts of the Sierra Nevada, have small glaciers near their summits.

On the coast, close to the Pacific Ocean, are rugged mountains which are not so high as the Sierra Nevada. They are the Coast Ranges in California and Oregon, and the Olympic Mountains in Washington. They are separated from the Cascade Range and the Sierra Nevada by the wide valleys of Puget Sound and the Willamette, Sacramento, and San Joaquin rivers.

56. Summary.—The chief regions of the United States, studied according to their surface, are as follows: the Atlantic Lowland, the Appalachian Mountains, the Appalachian Plateau, the Great Lake region, the plains of the Mississippi Valley, the Gulf Plains, the Rocky Mountains, the Columbia and Colorado plateaus, the Great Basin, and the Pacific ranges and valleys. The student should now be able to draw a map, showing these regions as they are shown on the physical map (Fig. 58).

U. S. Geological Survey

Fig. 69. Mt. Shasta, an ancient volcanic peak

Review.—1. What is meant by the relief of the land? 2. In what ways may we show relief by a map? 3. Explain the meaning of a contour map. 4. In what way is it superior to other relief maps?

5. What is a bed of rock? 6. In what condition are the rock beds when first formed? 7. What is the position of the beds in much of this country? 8. In what other shapes or positions are beds of rock sometimes found?

9. How does the Atlantic Lowland northeast of the city of New York differ from the lowland south of that city? 10. What is the Fall Line? What regions does it separate? 11. Why is the Atlantic coastal plain called the Tidewater country?

12. What names are borne by different parts of the Appalachian Mountains? 13. In what states is the Blue Ridge? 14. What is the Great Appalachian Valley? 15. Name rivers whose courses are wholly or partly in this valley.

16. How does the Appalachian Plateau compare in height with the Appalachian Mountains? 17. Is the position of the rocks alike in both? 18. What name does this plateau have in eastern New York? In Kentucky and Tennessee?

19. What does the St. Lawrence River system include? 20. How do the Great Lakes affect the climate of the regions about them? 21. In what other ways are the lakes useful? 22. Where is the Welland Canal? 23. What other canals are used by a boat sailing from Lake Superior to the ocean?

24. What is a prairie? Which are the prairie states? 25. Where is the Ozark Plateau? 26. Where are the Gulf Plains, and what other plains in the United States do they resemble? 27. Where are the Great Plains? 28. What is their altitude on their western edge?

29. In what states are the Rocky Mountains? 30. What are the *parks* in these mountains? 31. Describe the Columbia Plateaus. 32. Where is the Grand Canyon of the Colorado? 33. What mountain ranges are east and what are west of the Great Basin? 34. Why are some lakes salt? 35. Name the volcanic peaks of the Cascade Range. 36. What range of mountains is on the coast in Washington?

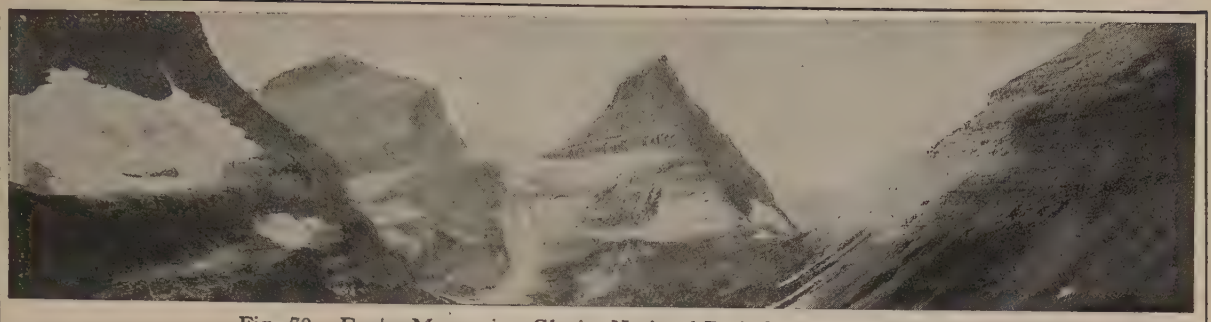

Fig. 70. Rocky Mountains, Glacier National Park, Montana, in summer

CLIMATE OF THE UNITED STATES

57. Weather and Climate.—There is a difference between *weather* and *climate*. When we speak of the weather, we refer to the conditions of dryness or rainfall, of heat or cold, for a day or two, or to the changes of sunshine and storm, or of wind or temperature within a few days. When we speak of climate, we mean the prevailing conditions of the atmosphere for several seasons or years, or for a long period of years. The climate of a region is sometimes called its *average weather conditions*.

In our study of the climate of North America we saw that climate depends mainly on four conditions: (1) latitude, which determines whether the sun's rays strike vertically or slantingly; (2) altitude, which may give an Arctic climate even near the Equator; (3) nearness to the sea, on the windward side of the continent, giving an even, oceanic climate, or remoteness from the sea, giving a continental climate, marked by extremes; (4) the direction of the prevailing winds. The moisture which has evaporated from the surface of water bodies moves with the winds.

58. Temperature.—In southern Florida the Atlantic Lowland has a warm climate, but as we go north the temperature gradually becomes lower until we reach New England. In the coastal lowland of New England the winters are moderately cold and the summers are warm. The Appalachian Mountain belt varies from mild winters in North Carolina to severe winters in the Adirondacks and in the mountains of northern New England. Sometimes the temperature is 40° or more below zero during the winters in the Adirondack region.

In Louisiana the Mississippi Valley has hot summers, but is liable to frosts from November to March. As we go north we find greater extremes of heat and cold, and in some parts of Minnesota the temperature ranges from 102° above to 45° below zero.

The Pacific coast usually has mild summers, with warm, pleasant winters in southern California, and mild winters in western Oregon and western Washington. This is because the winds that blow from the ocean over the lands are warmer than the land in winter and cooler than the land in summer.

In the interior, the temperature of the Cordilleran highlands varies according to latitude and altitude. Thus the lowlands in the southern part of the Great Basin and in the southern part of Arizona are among the warmest regions in the United States, sometimes reaching a temperature of 125° on the hottest days. The high plateaus in Utah and other states to the north are much cooler. The higher parts of the Rocky Mountains, of the Wasatch Mountains, of the Cascade Range, and of the Sierra Nevada have snow or ice in some places throughout the year. There is often a very great difference between the day and night temperatures of dry regions, the temperature frequently falling so low at night as to cause frosts in summer.

Fig. 71. Average length of crop-growing season in the United States—number of days without killing frost

U.S. Dept. of Ag.

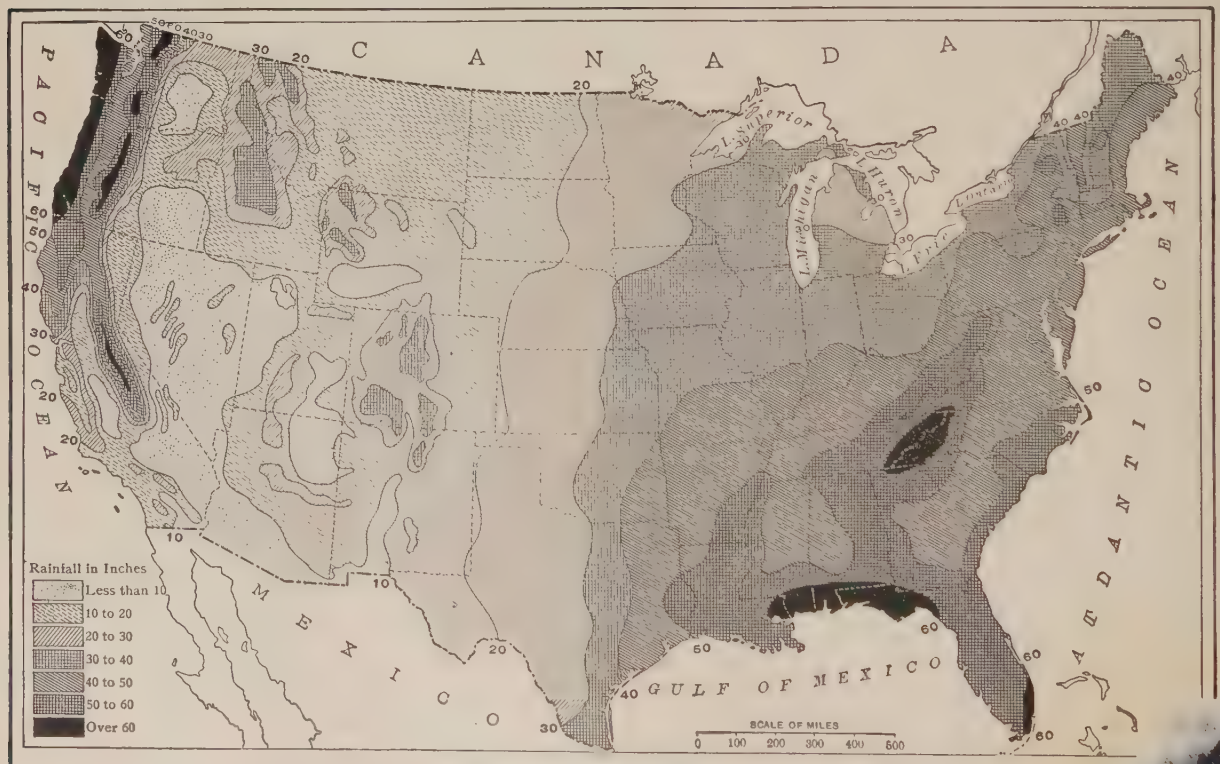

Fig. 72. Average annual rainfall in the United States

59. Growing Period.—Figure 71 tells the conditions of heat and cold in the United States by the number of days during the year in which crops can grow in the different parts of the country. Each line passes through places that have about the same number of crop-growing days.

In the far south, along the Gulf of Mexico, are lands in which growth takes place for 260 days or more; that is, about nine months or longer each year.

Trace the line of 200 days. South of this are nearly all the southern states, where crops can grow for about seven months or more.

Trace the lines that mark 150 days. See what effect the Great Lakes have in lengthening the growing season about them. Compare Lake Ontario shores, with 170 days of growth, with a small region on the boundary of New York and Pennsylvania, with only 130 days. This region is away from water and on high ground. Part of northern Michigan has 100 days, while to the north, on the shore of Lake Superior, there are 140 days.

Find the regions in which frosts are rare and the regions where the possible crop-growing season is less than 90 days.

60. Rainfall.—The rainfall is to be carefully studied in connection with the map (Fig. 72). Rainfall is measured by catching the rain in a vessel with vertical sides and measuring the depth of the water. If the moisture falls in the form of snow, the snow is melted and the measure of the water thus obtained is added to that of the ordinary rainfall. By adding the amounts for each storm the number of *inches* of *rainfall* for a year is found. The figures and shadings of the map show the annual rainfall in inches.

Where the annual rainfall is more than 50 inches a year, it is considered large. If it is more than 20 inches, it is nearly always enough for good crops. Where it is less than 20 inches, most crops need to be irrigated or be cultivated in special ways. Where it is less than 10 inches, the region is *arid*, and such regions are usually called deserts.

In Figure 72 observe the line running through Texas, western Kansas, and the eastern half of the Dakotas. All the country east of this line has more than 20 inches. The moisture that produces this rain comes mainly from the Gulf of Mexico and from the Atlantic Ocean. The lands near the ocean have the most rain, and a region far inland has the least. The places that have more than 60 inches are on the Gulf Coast and in the highest parts of the Appalachian Mountains in North Carolina and adjoining states. The large rainfall helps to explain the heavy forest in these regions. The belt of more than 50 inches reaches from eastern Texas to Virginia. Trace on the map the rainfall belts as follows: 40–50 inches, 30–40 inches, 20–30 inches.

In the western United States the heavy rainfall is along the coast and more to the north. There is a region of heavy rainfall extending from central California to Canada along the Coast Ranges, and a larger region extending through the Sierra Nevada and the Cascade Range. The moist, warm air of the Pacific Ocean moves in the westerly winds up into the mountains, where it is chilled as it rises, so that the vapor condenses and falls as rain or snow. In these mountains there are heavy forests and the largest trees in the world. East of the Sierra Nevada and the Cascade Range most of the country has less than 20 inches, until we come to the line running through Texas, Kansas, and the Dakotas. The winds that have crossed the mountains are warmed as they descend and are prepared to take up moisture. A large area in the Great Basin and in southern Arizona has less than 10 inches, and is a true desert (Figs. 72 and 73). As the winds rise again in crossing the high mountains farther inland some of their moisture is condensed, so that there are regions in the Wasatch and Rocky Mountains having more than 20 inches.

Fig. 73. Desert in Arizona, nearly 300 miles from the Pacific Ocean

The eastern part of the country receives its moisture from the Atlantic Ocean and the Gulf of Mexico; the western part receives moisture from the Pacific Ocean; and both in the east and in the west we find less rain as we go from the coast to the interior.

61. Storms of the Westerly Winds.—In all the northern parts of the United States, and in much of Canada, the winds, while they frequently vary, blow more often from the west, northwest, or southwest than from other directions. Many trees in open fields incline eastward, and we must usually look to the winds for an explanation.

If we watch a vane upon a church spire or upon a barn for a number of weeks and record its direction once or twice each day, we shall see that the wind blows from the west or southwest more often than from any other direction.

Most of the storms in the temperate zone in North America come in connection with these prevailing westerly winds. As such a storm approaches a place the air grows warmer, and in summer sometimes becomes very hot. The thermometer may stand at 90°, 100°, or even higher. A temperature of 100° is 2° warmer than our bodies, and makes us very uncomfortable from the heat.

At the same time the air is sultry or muggy. It is not only hot, but *humid;* that is, full of moisture. The winds, when they spring up, may come from the south, southeast, or southwest. Clouds may overspread the sky and rain begin to fall. Often the rain comes in a thunderstorm. Cloud masses or "thunderheads" rise, and then the storm bursts with vivid lightning and long peals of thunder. The succession of thunderstorms or the quiet rains may cover an area hundreds of miles across.

As the storm or the succession of storms, which may last a day or more, passes by, the wind changes to the northwest, the air becomes cooler, the clouds disappear, and a period of clear weather follows. We say that a *hot wave* has been followed by a *cool wave.*

Similar changes come in the winter. A south wind blows, the air grows warmer, and the sky becomes cloudy. In the northern states at this time snow usually falls instead of rain, though sometimes there is a "break-up" and rain falls even in midwinter. People in some sections look for what they call the "January thaw." In the winter, as in the summer, the storm passes by, the wind changes to the northwest, the skies clear, and cooler weather follows. It is the "cold snap," or "cold wave," and the thermometer in some regions may indicate many degrees below the zero point.

62. The Cyclone.—All this the student can observe for himself, and he is now ready to learn a little more fully the meaning of what he has observed. In the temperate parts of the United States and of Canada the atmosphere is like a sea of air moving eastward over the land. In this moving sea of air there is often a large region in which the air is warmer and lighter than the sur-

rounding colder air. The result is that the colder air pushes in from all sides along the ground, and pushes up the lighter, warmer air. This pushing in from all sides means that winds blow toward the center from all directions, making a kind of whirl in the general eastward movement. Such an area is known as a *cyclonic area* (central part of Fig. 74). It usually appears in the northwestern states and western Canada, moves eastward through the northern states, along the Great Lakes, and passes on across the Atlantic Ocean.

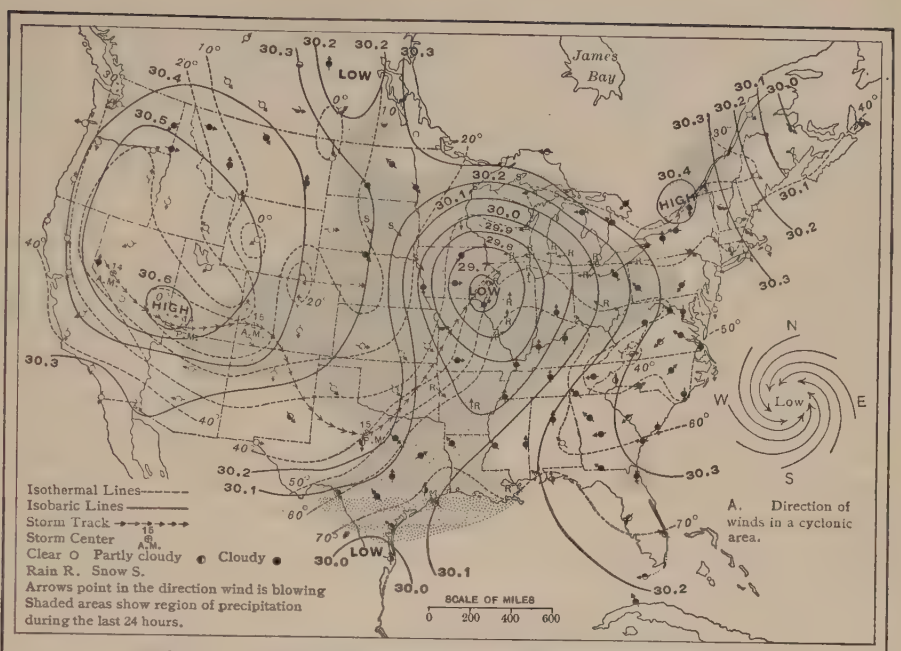

Fig. 74. Weather map, showing a cyclonic area, see Fig. 75

The warm, moist air of the cyclonic area cools as it rises, and the moisture is condensed and falls as rain or snow.

The direction of the winds in the forward-moving cyclone does not change (Fig. 74, A). As the cyclone approaches and passes the place where we are living, we notice changes in the direction of the winds because we are, from time to time, in different parts of the cyclonic area. Around the central part of the storm area the winds may be changeable and violent. When the center of the area passes to the east, the winds are from the northwest or west, the clouds pass off, and the weather is clear and cool.

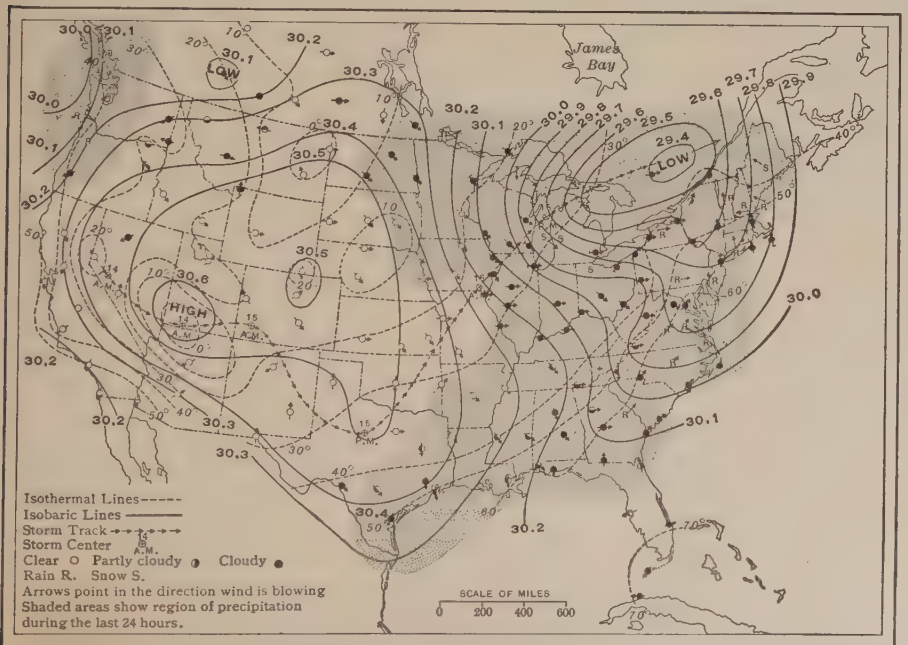

Fig. 75. The eastward advance, in one day, of the cyclonic area shown in Fig. 74

These are the storms of the westerly winds, and they are frequent. They nearly always pass eastward over about the same regions, and the line of their movement is

called a storm track. Telegraphic reports show where the cyclonic winds and rains are at a given time, and how fast they are moving eastward. It is therefore possible to tell when a storm now in North Dakota is likely to arrive in the region of Lake Erie or over New England.

63. Weather Bureau.—It is often very important that farmers, sailors, and others should know about the approach of storms and about the changes in temperature and rainfall that may come. For this purpose the United States Weather Bureau has been formed. It has a central office in Washington, and there are local offices at many other places, as well as many observers scattered over the country.

Each day each observer records the temperature, the pressure of the air as told by the barometer, the rainfall, the direction of the winds, and the condition of the sky, and he reports these facts to one of the offices of the Weather Bureau by telegraph. In these offices expert students compare the facts from all parts of the country, plot them on a map, tell where the storm areas are, and send out to the newspapers and to many public institutions the weather report for the day. It is the movement of the storm areas that enables the weather observer to forecast what the weather is likely to be for a day, or two or three days, in advance. People who profess to foretell the weather for a long time ahead are not to be trusted.

64. Summary.—Three important subjects have now been studied concerning the climate of the United States. The first is temperature, depending on latitude, altitude, and relation to the sea, and showing great differences in the length of the crop-growing period in various parts of the United States. The second is the rainfall, which in most regions is enough for crops, but in some is so light that the land is a desert (Figs. 72 and 73). The third is the prevailing movement of the atmosphere in the temperate regions, from west to east, broken by the great whirls of wind and rain or snow, known as cyclonic storms. As we study the different parts of the United States, we shall learn other facts about climate.

Review.—1. Give definitions of *weather* and *climate*. 2. What conditions control climate? 3. What region has a growing period of 260 days in each year? A period of 150 days? Of 100 days? 4. How many degrees of latitude between the first region and the last? 5. Why does the temperature of these two regions differ? 6. How is rainfall measured? 7. What would be called a large rainfall? 8. Compare the rainfall along the Atlantic coast with the rainfall east of the Rocky Mountains and give the reason for the difference. 9. Where are the areas of the largest rainfall in the United States? 10. What is the rainfall of your own state? 11. Describe a "storm of the westerly winds." 12. What is a "cyclonic area"? What is the usual course or track of such storms in the United States? 13. Explain the work of the United States Weather Bureau. 14. From what station of the Weather Bureau does your town receive the daily weather map?

GROWTH OF THE UNITED STATES

65. The Original Colonies.—The original thirteen colonies lay along the Atlantic Lowland, but they claimed lands extending westward across the Appalachians. After the American Revolution, Great Britain gave up to the United States all the land lying east of the Mississippi River, from Canada to the Spanish colony of Florida (Fig. 76). Most of the people were east of the Appalachians. To the west of the Appalachians there were few settlements, and most of the unoccupied land was given to the United States by the states that had claimed it.

66. Louisiana Territory.—In 1803 the Louisiana Territory was bought from France. The present state of Louisiana is but a small part of this territory, which extended northward to Canada and northwest from the Mississippi River to the Rocky Mountains. What states are wholly or partly included in the "Louisiana Purchase" (Fig. 76)?

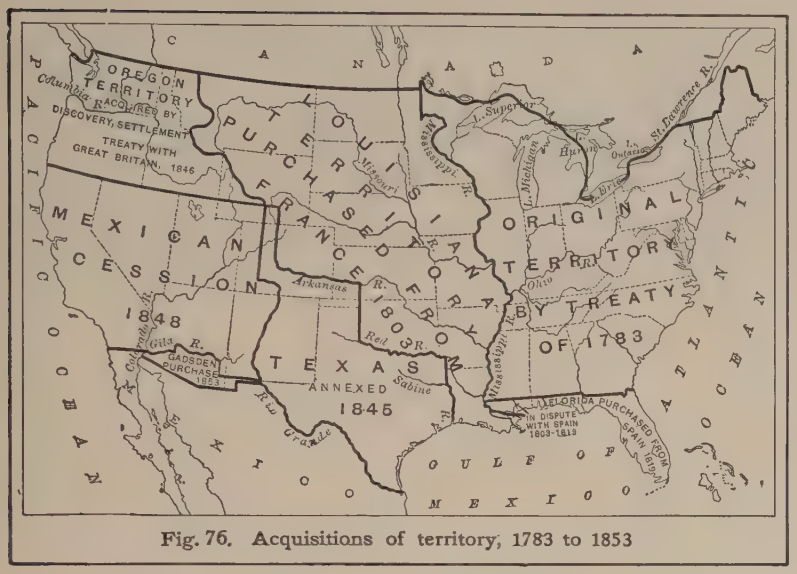

Fig. 76. Acquisitions of territory, 1783 to 1853

67. Spanish Territory on the Gulf of Mexico.—In 1819 Florida was bought from Spain. This gave the United States the Gulf and Atlantic coast line from the east border of Texas to the east border of Maine. In 1836 Texas separated from Mexico and became an independent republic. In 1845 it was annexed to the United States, and the Rio Grande became part of our southern boundary.

68. Oregon Territory.—For a long time the land of the present states of Idaho, Washington, and Oregon was part of the "Oregon Country" claimed by Great Britain; but in 1846 this region became the property of the United States. Then for the first time the United States reached from the Atlantic to the Pacific and had harbors and outlets for foreign trade on two oceans.

69. California.—The lands west of Texas and south of Oregon, including California, the Great Basin, and the Colorado Plateaus, were acquired from Mexico in 1848, and a small tract on the Mexican border was added in 1853. How many years is it since the main area of our country was thus completed?

70. Alaska and Other Possessions.—Alaska was bought from Russia in 1867, and the Hawaiian Islands were annexed in 1898. As a result of the war with Spain, Porto Rico, the Philippine Islands, and Guam came into our possession in 1898. A part of Samoa was added in 1900. The United States has also taken possession of several very small islands in the Pacific Ocean. In 1903 control of the Canal Zone was acquired from Panama. Three of the Virgin Islands were purchased from Denmark in 1916.

The original United States in 1783 contained 892,135 square miles. The lands which are now under the American flag make a total of about 3,800,000 square miles.

71. The Westward Movement.—In 1790, or seven years after the treaty of peace was made with Great Britain, the first *census* of the United States was taken. This counting of population, and of the products of industry, has been made by the government every ten years since that time. The first census showed that there were 3,929,214 persons in the United States. Most of them lived within 200 miles of the Atlantic coast, and mainly on the Atlantic lowlands. A few had pushed into the valleys among the mountains. West of the mountains, the largest settlements were in the region of Pittsburgh, and in Tennessee and Kentucky along the Cumberland and Ohio rivers (Fig. 77).

Fig. 77. Where the people lived in 1790

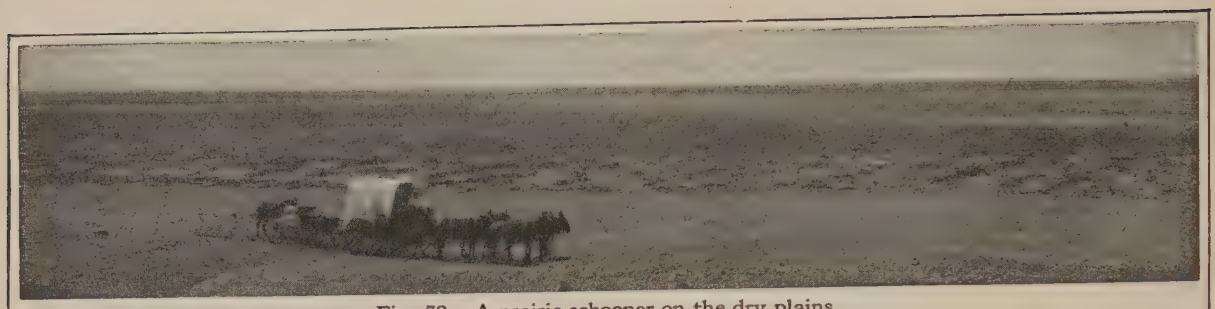

Fig. 78. A prairie schooner on the dry plains

As the population of the Atlantic states increased, many left their old homes and sought larger opportunities for themselves and their children in the unoccupied lands farther west. They went on foot or with wagons, carrying a few household treasures to start new homes in the "West." Many went by the Mohawk Valley and along the plains south of Lake Ontario and Lake Erie. Others went from Philadelphia to the Ohio River at Pittsburgh, and there built rude houseboats and floated down the river to take up land and make a home.

72. New States.—So many people settled west of the Appalachians that new states were formed and admitted to the Union, joining the thirteen original states. In this way Kentucky was admitted in 1792, Tennessee in 1796, Ohio in 1803, five other western states in 1812–1819, and Missouri, the first new state entirely west of the Mississippi, in 1821. Iowa, just north of Missouri, did not become a state until 1846. This is within the memory of men still living, and shows how young some of the states are; for nineteen are younger than Iowa.

Up to this time there were few white men in the far West. In 1848 gold was found in California, and there was great excitement in the East. People went west by thousands. Some traveled by wagons, called prairie schooners, across the dry plains and through the mountain passes (Fig. 78). Others went by way of Panama, or sailed around Cape Horn, in the great rush for gold. At the end of 1849 California had more than 100,000 people, and in 1850 it was admitted to the Union as a state,—the first one in the Cordilleran region.

73. Immigration.—Many of the people who have spread over our country within the past one hundred years are the descendants of the pioneers of the Atlantic coast. They are therefore of English, Scotch, Irish, Dutch, or German blood. Millions of people, mostly in the last fifty years, have come directly from Europe,—from Great Britain, Norway, Sweden, and Germany in the north, from Russia in the east, and from Italy, Hungary, and other nations in the south.

More than ten million of our people are descendants of negroes brought from Africa.

Fig. 79. Distribution of population in 1850

74. Where the People Now Are.—By *density of population* we mean the number of people living on a square mile of land surface. When we speak of the density of population of a country or state, we mean the average number of people per square mile. For example, there are parts of Chicago or New York where tens of thousands of people occupy a square mile, and there are square miles in the Adirondacks or in the Rocky Mountains, or on the dry plains, where not a single person lives.

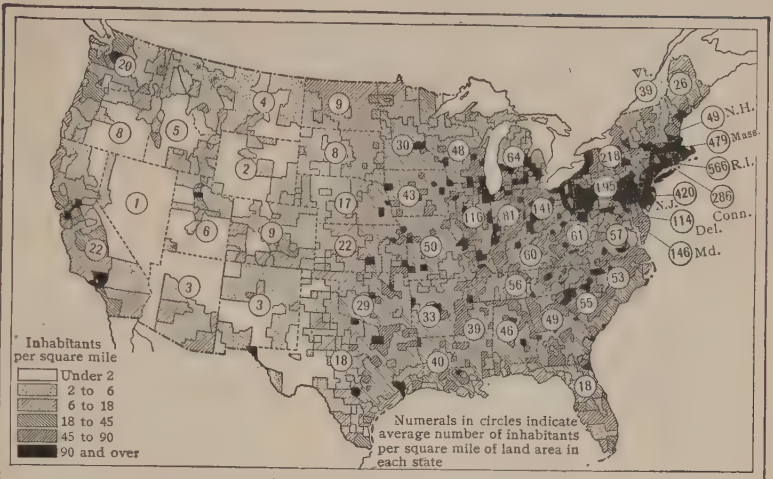

Fig. 80. Distribution of population in 1920

The map (Fig. 80) gives the average density, by counties and by states. The density for the whole country is 35. Study the explanation of the different shadings and of the numbers. Rhode Island has the greatest density, 566. Nevada has the least density, or 1. Observe that all states having more than 100 persons to the square mile are east of the Mississippi River and north of the Ohio and Potomac rivers. Pick out, in their order, the five states that have the greatest density of population. What states east of the Mississippi River have fewer than 50 people per square mile? Divide the country into three sections, of which one has great density, another has medium density, and the third a scattered population.

States may have few people because they are young and have lately been settled. Thus some states of small density west of the Mississippi River will have many more people as they grow older and the water, soils, and minerals are more fully used.

75. Industries of the United States.—The growth of our country's industries has been no less marvelous than the growth of its territory and its population.

To-day the United States ranks first among the countries of the world in the production of corn, wheat, cotton, and tobacco. Figure 81 shows in what parts of the country each of these crops is chiefly grown. Many other crops are grown, and the United States is a large producer of apples, peaches, lemons, oranges, and other orchard and smaller fruits.

Our country also produces more coal, iron ore, petroleum, and copper than any other country in the world, and stands second only to South Africa in the production of gold and to Mexico in the mining of silver. Figure 81 shows the location of the different mineral regions in our country.

In the animal industries the United States rivals China as a producer of swine, ranks second to India in the number of cattle, and is exceeded only by Australia and Argentina in the number of sheep. In its fishing industries its annual catch compares with those of Great Britain and Japan, these three leading all other countries in the products of the sea.

The raw materials above mentioned, with others imported for the purpose, have led to the development of great manufacturing industries, especially in the northeastern section of the country. The growth of manufacturing has led to the concentration of laborers and the development of cities and villages. More than half of the population of the United States is in cities or villages of more than 2500 inhabitants

REFERENCES
Corn
Wheat
Cotton
Tobacco
Coal
Petroleum
Iron Mines
Gold
Copper
Silver
Zinc
Lead
Manufactures
Railroads
Steamship Lines
Fisheries
DOMINION
MONTANA
NORTH DAKOTA
SOUTH DAKOTA
WYOMING
NEBRASKA
COLORADO
KANSAS
OKLAHOMA
TEXAS
NEW MEXICO
ARIZONA
NEVADA
UTAH
IDAHO
OREGON
WASHINGTON
CALIFORNIA
MEXICO
Gulf of California
Lower California
Pacific Ocean
Mexico, Central America, Panama and South America
Longitude

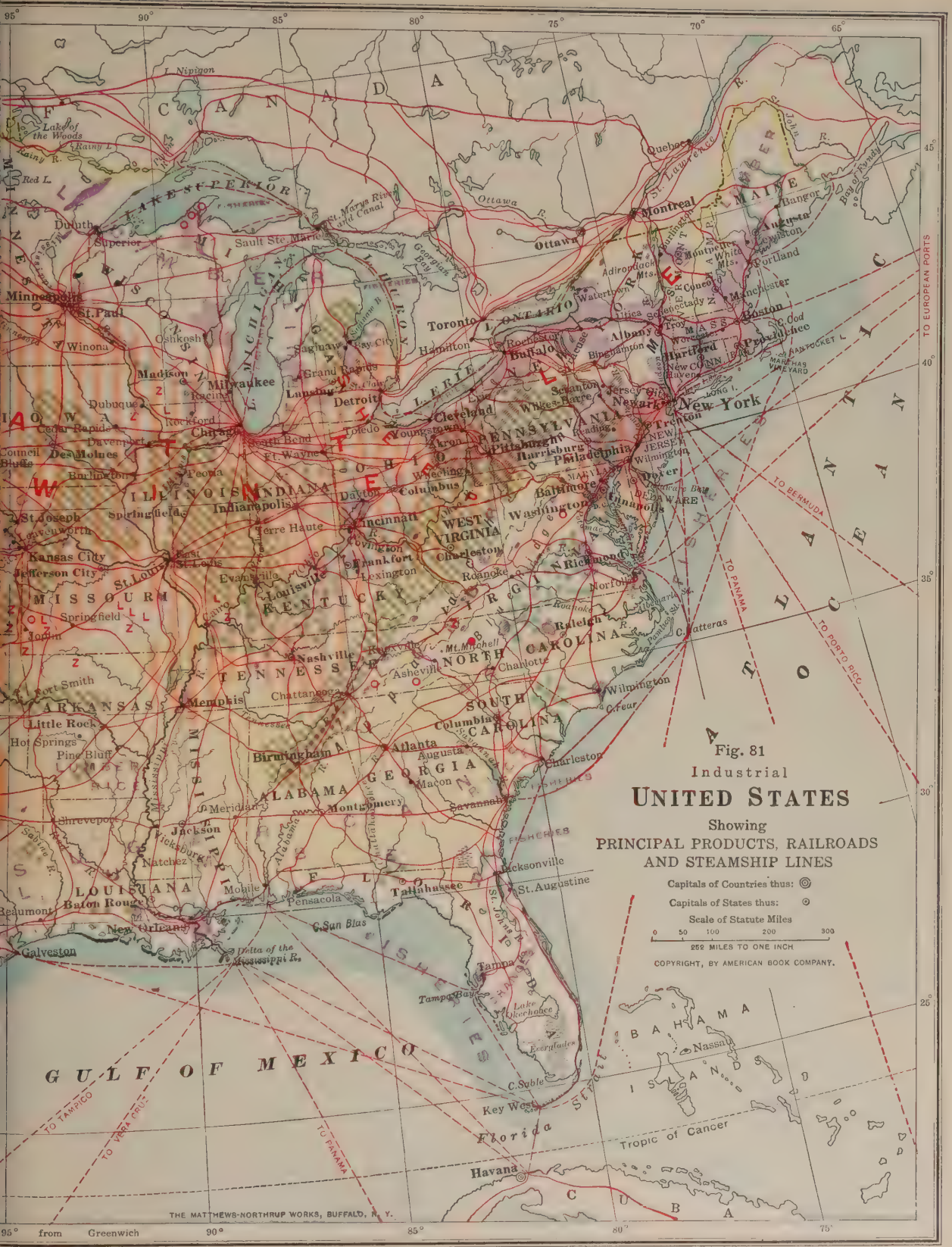
Fig. 81
Industrial
UNITED STATES
Showing
PRINCIPAL PRODUCTS, RAILROADS
AND STEAMSHIP LINES
Capitals of Countries thus: ◎
Capitals of States thus: ⊙
Scale of Statute Miles
0 50 100 200 300
252 MILES TO ONE INCH
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CANADA
GULF OF MEXICO
ATLANTIC OCEAN
BAHAMA ISLANDS
CUBA
Florida
Tropic of Cancer
TO BERMUDA
TO PANAMA
TO PORTO RICO
TO TAMPICO
TO VERA CRUZ
TO EUROPEAN PORTS
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
Lake Ontario
Montreal
Quebec
Ottawa
Toronto
Boston
New York
Philadelphia
Baltimore
Washington
Chicago
Milwaukee
Detroit
Cleveland
Buffalo
Pittsburgh
Minneapolis
St. Paul
Duluth
Superior
Sault Ste. Marie
Omaha
Kansas City
St. Louis
Cincinnati
Louisville
Indianapolis
Memphis
Nashville
Atlanta
Charleston
Savannah
Jacksonville
New Orleans
Galveston
Mobile
Havana
Key West
Nassau
Tampa
Tampa Bay
Pensacola
Montgomery
Birmingham
Richmond
Norfolk
Raleigh
Wilmington
Charlotte
Columbia
Hatteras
Fear
Bangor
Portland
Augusta
Manchester
Albany
Troy
Hartford
Providence
Newark
Trenton
Wilmington
Dover
Annapolis
Pittsburgh
Harrisburg
Scranton
Wilkes-Barre
Reading
Rochester
Syracuse
Binghamton
Buffalo
Cleveland
Akron
Youngstown
Toledo
Detroit
Grand Rapids
Saginaw
Bay City
Lansing
Milwaukee
Racine
Madison
Chicago
Rockford
Dubuque
Davenport
Rock Island
Des Moines
Council Bluffs
Omaha
Winona
Oshkosh
Green Bay
Duluth
Minneapolis
St. Paul
Superior
Sault Ste. Marie
Lake of the Woods
Rainy L.
Red L.
Nipigon
Ottawa R.
St. Lawrence R.
St. John R.
Bay of Fundy
Adirondack Mts.
White Mts.
Green Mts.
Berkshire Hills
Catskill Mts.
Blue Ridge
Alleghany Mts.
Cumberland Mts.
Appalachian Mts.
Ozark Mts.
Rocky Mts.
Sierra Nevada Mts.
Mississippi R.
Missouri R.
Ohio R.
Tennessee R.
Cumberland R.
Arkansas R.
Red R.
Rio Grande
Colorado R.
Columbia R.
Hudson R.
Delaware R.
Chesapeake Bay
Delaware Bay
Long I.
Martha's Vineyard
Nantucket I.
C. Cod
Lake Okeechobee
Everglades
C. Sable
C. San Blas
Delta of the Mississippi R.
Iowa
Illinois
Indiana
Ohio
Kentucky
Tennessee
Missouri
Arkansas
Louisiana
Mississippi
Alabama
Georgia
South Carolina
North Carolina
Virginia
West Virginia
Pennsylvania
New York
New Jersey
Maryland
Delaware
Connecticut
Rhode Island
Massachusetts
Vermont
New Hampshire
Maine
Texas
Kansas
Nebraska
Minnesota
Wisconsin
Michigan
Oklahoma
Colorado
Wyoming
Montana
North Dakota
South Dakota
New Mexico
Arizona
Utah
Nevada
Idaho
Oregon
California
Washington
95° from Greenwich
90°
85°
80°
75°
70°
65°
45°
40°
35°
30°
25°

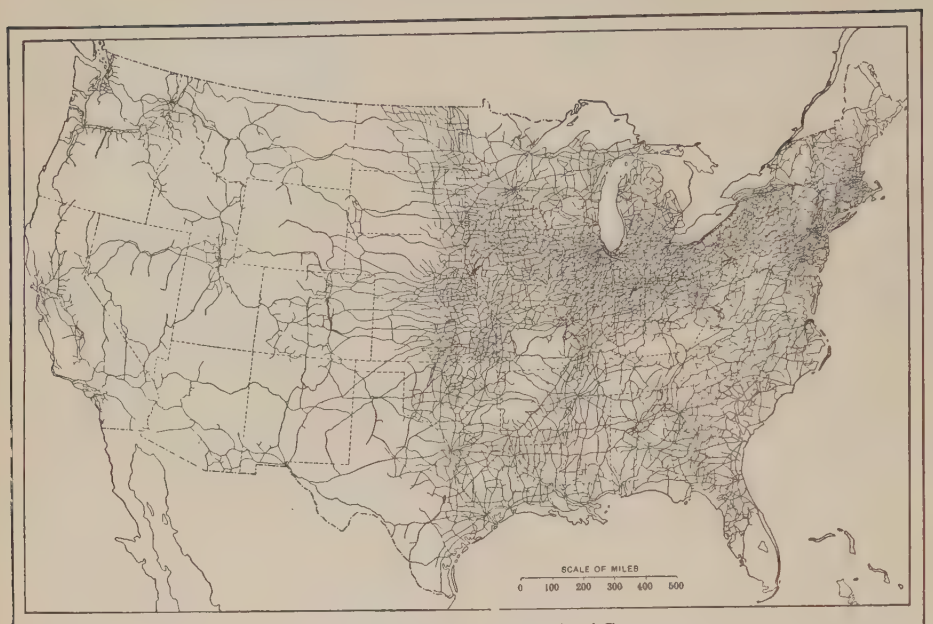

Fig. 82. Railroads of the United States

The cities are connected by a network of railroad lines which make easy the trade between the various parts of the country, and the United States now has a far greater railroad mileage than any other country in the world (Fig. 82).

76. **Foreign Trade.**—The United States and Great Britain are the chief trading nations.

In the early days the ships that left our ports were laden with food supplies and raw materials needed by the industrial population of Europe. In recent years, however, in spite of a constant and rapid increase of foreign commerce, most of our food supplies are consumed at home and our raw materials are largely manufactured in our own factories. Cotton is the only raw material that is still exported in very large quantities, but we export also much coal, tobacco, petroleum, and timber. At the same time the exportation of manufactured goods ready for use has enormously increased.

In imports similar changes may be noted. The importation of foodstuffs has remained about the same for many years, but the importation of manufactured goods has relatively decreased, while the importation of raw materials for use in our factories has greatly increased. Our imports include coffee, sugar, rubber, silk, and a great variety of other products. The American nation is no longer selling merely its raw materials. It is, instead, using them to give employment to labor in its factories, and the products of these factories find a ready sale in foreign as well as in domestic markets.

The recent war in Europe caused an enormous increase in the manufactures, shipbuilding, and commerce of the United States, especially the trade with European countries.

Review.—1. What was the extent of our territory at the close of the American Revolution? 2. Give an account of the Louisiana Territory and its purchase. 3. Give the date of the annexation of Texas. 4. When was the Oregon region acquired? 5. What lands were bought in 1848? 6. What was the population of the country at the first census? 7. Give the date of this census. 8. What were the first states formed west of the Appalachian Mountains? 9. When was gold first found in California?

10. What is meant by *density of population?* 11. What is the density in Rhode Island? In Iowa? In Nevada? In your own state?

12. In what crops does the United States rank first among the countries of the world? 13. Which parts of the country produce corn? Cotton? 14. What regions yield gold? Silver? Coal? Iron ore? Petroleum? Copper?

15. Which part of the country has the most railroads? On the railroad map point out the location of the Appalachian Mountains; the Rocky Mountains; the Sierra Nevada; the Coast Ranges.

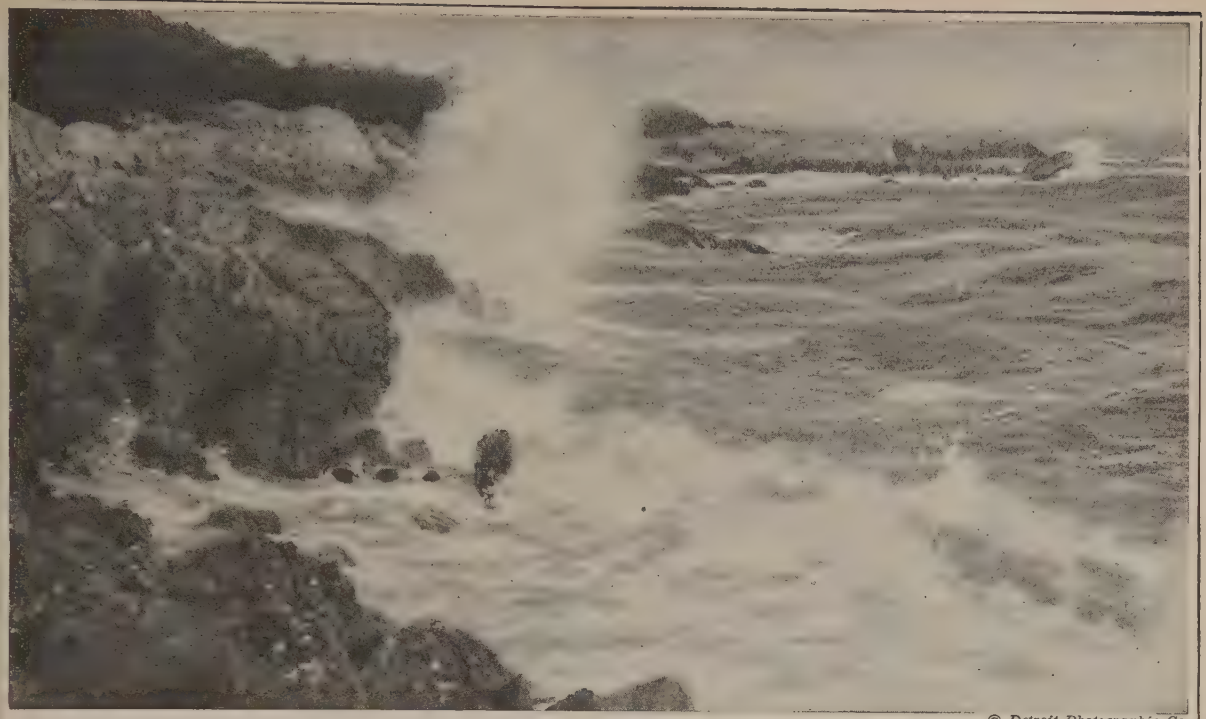

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Fig. 83. On the coast of New England

THE NEW ENGLAND STATES

77. Early Settlement.—It was not long after the voyages of Columbus (Sec. 34) that several of the nations of Europe became interested in the exploration and settlement of the New World that he had discovered. Expeditions were sent out from France, England, the Netherlands, and Spain, and soon the governments of these countries began to claim as their own those parts of North America that their seamen had explored.

That portion of our country now called New England was one of the parts of the continent claimed and settled by people from England, as its name suggests. They had left their homes beyond the sea because they wished to worship in the way they thought right. This they had not been permitted to do in their old homes. To enjoy this right they were ready to endure any hardship and to work with all their strength in the new land, and they had need of all their courage.

The coast of this part of our continent is, for the most part, exceedingly rugged, and to those first settlers it must have been very forbidding. The land was covered with dense forests. The climate they found to be much more severe than that of the mother country, and there was a native population that soon became unfriendly. It was only after many years of toil and suffering that the people finally won safety and comfort.

In the years that have passed since then, the population has increased enormously, especially in the southern states of the group, and New England is now one of the richest and most populous parts of our country. The chief industry of the first settlers was agriculture, and most of the manufactured articles needed were made at home or brought from across the sea. Now the chief industry is manufacturing, and agriculture is of secondary importance.

Fig. 84
Physical and Political
NEW ENGLAND STATES
Scale of Statute Miles
0 10 20 30 40 50 100
58 MILES TO ONE INCH
Capitals of States thus: ⊙
ELEVATIONS IN FEET
OVER 5000
2000 TO 5000
1000 TO 2000
500 TO 1000
SEA LEVEL TO 500
ATLANTIC OCEAN
Gulf of St. Lawrence
Bay of Fundy
Quebec
Montreal
Lake Champlain
Lake Memphremagog
Lake Winnipesaukee
Lake George
Mt. Washington 6,279
Mt. Abraham 3,889
Mt. Katahdin 5,200
Mt. Greylock 3,505
Mt. Tom
Mt. Holyoke
Mt. Monadnock 3,165
Mt. Mansfield 4,364
Mt. Kineo
Mt. Desert I.
Block I.
Long Island
Martha's Vineyard
Nantucket I.
Cape Cod
Cape Ann
Isles of Shoals
Penobscot Bay
Casco Bay
Buzzard's Bay
Narragansett Bay
Long Island Sound
Connecticut R.
Merrimack R.
Androscoggin R.
Kennebec R.
Penobscot R.
St. John R.
St. Francis R.
St. Lawrence R.
St. Maurice R.
Richelieu R.
Chaudière R.
Aroostook R.
Allagash L.
Chamberlain L.
Heron L.
Chesuncook Lake
Moosehead Lake
Rangeley Lakes
Chiputneticook Lakes
Grand L.
Eagle Lakes
Wallagrass
Millinocket
Danforth
Houlton
Ashland
Presque Isle
Caribou
Ft. Fairfield
Ft. Kent
St. Francis
Van Buren
Dover
Dexter
Lincoln
Milo
Greenville
Orono
Old Town
Bangor
Brewer
Pittsfield
Madison
Skowhegan
Farmington
Fairfield
Waterville
Augusta
Hallowell
Gardiner
Richmond
Chelsea
Camden
Rockland
Belfast
Bucksport
Ellsworth
Millbridge
Jonesport
Machias
Machias Bay
Eastport
Lubec
Calais
Bar Harbor
Eden
Rumford
Jay
Livermore Falls
Lewiston
Auburn
Norway
Paris
Oxford
Gorham
Colebrook
North Stratford
Lancaster
Berlin
Littleton
Lisbon
Bethlehem
Franconia
Woodsville
Haverhill
Newbury
Barre
Montpelier
Waterbury
Stowe
Burlington
Essex Jc.
St. Johnsbury
Lyndonville
Hardwick
Morrisville
Winooski
Swanton
Richford
Derby
Newport
Island Pond
Barton
St. Albans
Lake Champlain
Randolph
Brandon
Bethel
Middlebury
Vergennes
Bristol
Northfield
Plymouth
Hanover
Canaan
Proctor
Hartford
Rutland
Fairhaven
Poultney
Woodstock
Windsor
Lebanon
Bristol
Ludlow
Springfield
Claremont
Newport
Franklin
Laconia
Meredith
Wolfeboro
Sanford
Biddeford
Kennebunk
Kennebunkport
Brunswick
Bath
Sebago L.
Westbrook
Portland
S. Portland
Gorham
Sacco
Farmington
Rochester
Somersworth
S. Berwick
York Beach
York
Kittery
Dover
Exeter
Portsmouth
Piscataqua R.
Derry
Manchester
Concord
Walpole
Bellows Falls
Chester
Manchester
Keene
Milford
Hillsborough
Nashua
Haverhill
Newburyport
Lawrence
Andover
Gloucester
Williamstown
N. Adams
Adams
Greenfield
Athol
Halton
Hoosac Mt.
Turners
Deerfield
Falls
Fitchburg
Lowell
Gardner
Leominster
Vinecord
Clinton
Marlboro
Waltham
Newton
Cambridge
Boston
Chelsea
Lynn
Salem
Quincy
Weymouth
Brockton
Northampton
Great Barrington
Holyoke
Chicopee
Springfield
Ware
Spencer
Worcester
Milford
Southbridge
Webster
Westfield
Winsted
Enfield
Rockville
Torrington
Litchfield
Hartford
Manchester
Bristol
New Britain
Willimantic
Putnam
Central Falls
Pawtucket
Providence
Taunton
Attleboro
Plymouth
Fall River
New Bedford
Barnstable
Chatham
Monomoy Pt.
Nantucket
Edgartown
Sound
Woodstock
Thompson
Danielson
Norwich
Middletown
New London
Waterbury
Meriden
Naugatuck
Wallingford
Ansonia
Danbury
New Haven
Derby
Bridgeport
Norwalk
Stamford
Greenwich
Greenport
Montauk Pt.
Kingston
Newport
Westerly
Narragansett Pier
Pt. Judith
Block I.
Connecticut
Massachusetts
Rhode Island
Vermont
New Hampshire
Maine
New York
Canada
Longitude West 70° from Greenwich
72°
68°
46°
44°
42°
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Fig. 85. In the Berkshire Hills

THE NEW ENGLAND STATES

	Area. Sq. Mi.	Population, 1920	Capital
Maine	33,040	768,014	Augusta
New Hampshire	9,341	443,083	Concord
Vermont	9,564	352,428	Montpelier
Massachusetts	8,266	3,852,356	Boston
Rhode Island	1,248	604,397	Providence
Connecticut	4,965	1,380,631	Hartford

Map Study.—1. Which of the New England states border the Atlantic Ocean? 2. Which border New York? 3. Name the largest state and the smallest of the group. 4. What lake lies between Vermont and New York? 5. Trace the course of its outlet.

6. Locate Cape Cod. 7. Where is Narragansett Bay? Cape Cod Bay? Massachusetts Bay? Casco Bay? 8. Give the position of Marthas Vineyard, Nantucket, and Mt. Desert islands, and indicate to what state each belongs. 9. What body of water is south of Connecticut?

10. Where are the Berkshire Hills? The Green Mountains? The White Mountains? 11. Locate Mt. Washington and give its altitude. 12. Name and locate the largest lake in New Hampshire; in Maine.

13. Trace the course of the Connecticut River. 14. Use the scale of miles and give the length of this river. 15. Have you heard of any of the cities or towns on its banks? 16. What river is partly in New Hampshire and partly in Massachusetts? 17. Name the three chief rivers of southern Maine and trace their courses. 18. Name an important city on each of them. 19. Make from memory a sketch map of this group, showing state boundaries, chief rivers, and state capitals.

LAND AND PEOPLE

78. Surface.—New England has a hilly lowland near the sea and a hilly upland in the interior, with mountains in the north and west. Some of the hills of the lowland are rocky, but many consist of glacial waste piled into heaps and ridges of various forms.

The upland in central and western Massachusetts and northern Connecticut is a plateau varying from 900 to about 2000 feet in altitude, and having a hilly surface. The streams have cut deep valleys into the plateau. A good example is the Connecticut Valley, which in Connecticut and Massachusetts is not far above sea level.

The upland in western Massachusetts, known as the Berkshire Hills, is in some places quite mountainous (Fig. 85).

Farther north, in Vermont, are the Green Mountains, a range extending north and south, with many ridges and peaks.

In New Hampshire are the White Mountains (Fig. 86), some of whose peaks are named after former presidents of the United States. The highest point is Mt. Washington. A cog railroad ascends to its rocky summit, which stands out above the timber line. From it, one can see the ocean and look far into Maine and Vermont.

Fig. 86. White Mountains; Mt. Washington

Fig. 87. Lakes in southern Maine

79. Lakes and Swamps.—Lakes are common in New England; in fact, there are several thousand. Some are small ponds across which one could throw a stone, while Moosehead Lake, in Maine, is 35 miles long, and Lake Winnepesaukee, in New Hampshire, is 20 miles in length. There are also many lakes in most of the northern states and in Canada, — and indeed throughout the world in regions that were covered by ancient ice sheets. On the other hand, there are few lakes in the southern states, which were beyond the southern border of the ice sheet.

The glacial waste was often spread very unevenly, leaving basins that would hold water. Some of the old valleys, made by rivers long before the ice invasion, were blocked by piles of waste, called *moraines*. Behind these moraines, which served as dams, water gathered and formed lakes. In some places the ice rasped the solid rock so hard that it dug basins which are now occupied by lakes.

Many lakes are shallow on their edges, if not over their whole area. Mud is deposited on the lake bottom, and grasses, weeds, and mosses grow in the shallow places, thus gradually changing the lake into swamp lands. Some swamps, however, have never been lakes, but are in low or flat places from which the surface streams cannot drain off the water. In many swamps in New England, *peat* is found. Peat is formed from mosses, leaves, and trees that grow or lodge in swampy places, where the moisture keeps them from decay. If there is not enough water to preserve the vegetation from decay, it may form a deep layer of black soil, or *muck*, such as is found in many swamps.

80. Uses of Lakes.—The facts about the lakes of New England are true of the greater number of lakes in various parts of the world. Such bodies of water are useful in many ways. They serve as reservoirs to hold back the rain waters and prevent floods. Rivers with a steady flow are much more useful for water supply, for water power, and for navigation. The larger lakes are especially important for navigation and for supplies of fish. Along lake shores also there are attractive places where the people of city and country can find rest and amusement.

81. Rivers.—In general, the rivers of New England flow southward. The following, which are the most important, should be traced on the map (Fig. 84): the Connecticut, Merrimack, Androscoggin, Kennebec, and Penobscot. Three facts should be noted about New England rivers:—

(1) They are in a region of rains and snows, and they are fed by many lakes. Hence there is a constant supply of water.

(2) Many of the rivers have rapids and waterfalls formed where they descend to a lower level or where glacial waste has choked their ancient channels. This makes them useful in the manufacturing industries, because dams can be built and the waters taken out

in raceways for turning water wheels. The falls at Holyoke on the Connecticut River, and at Manchester and Lowell (Fig. 88) on the Merrimack River, are examples.

Fig. 88. Dam on the Merrimack River at Lowell

(3) On the shore the ocean waters slowly rise and fall twice in each period of about twenty-five hours. These changes of the water level are known as *tides*. Several of the larger rivers of New England are affected in their lower courses by this rise and fall of the tides. Such parts of rivers are said to be *tidal*. The Connecticut River is tidal for 40 miles inland, to the city of Hartford. Since the water is deep and flows quietly, ships can sail in the lower river below Hartford; but above that city the river is not navigable. Therefore Hartford is said to be at the *head of navigation*. Several of the larger rivers of Maine have falls at the head of their tidal channels. At these places cities have grown up, having the double advantage of water power and navigation. Bangor is an example.

82. Shore Line.—Much of the New England shore line is very uneven and rugged. There are long and rocky headlands, or *promontories*, with deep, narrow bays between. In a direct line it is a little over 200 miles along the coast of Maine from the New Hampshire boundary to Eastport, but the actual shore line of Maine, including all the windings and the shores of the islands, is about 2000 miles long.

From Boston southward, toward Cape Cod, the shores are rocky in places; but along the cape there are long stretches of sandy beach. Most of the cape is built of glacial waste, and some of the hills are of sand, blown and heaped up by strong winds. Such sand hills, or *dunes*, are found on the shores of many seas and lakes. At the tip of Cape Cod, where the sand is sometimes blown into the fields and gardens, the government has planted grasses (Fig. 89) and trees on the dunes to keep the sand in place. Such *sand binding* is done in many countries where the shores have drifting sands.

The southern shores of New England are irregular. Note the branches of Narragansett Bay in Rhode Island, and the bays and tidal river channels of Connecticut (Fig. 84).

Fig. 89. Grass planted on Cape Cod to keep the sand from blowing away

Marthas Vineyard and Nantucket, islands off the south shore of Massachusetts, are built of sands, gravels, and clays, and their surface and materials are much like those of Cape Cod.

The deep, narrow bays and tidal river channels were carved out by the rivers when this part of our continent was higher above sea level than it is now. Later the land slowly sank, and the sea water flowed into the lower ends of the valleys and between the hills along the shore. It flowed completely around some hills and turned them into islands. River valleys that have been filled with sea water in this way are called *drowned* valleys.

83. Climate.—The early settlers in New England were surprised and disappointed by the severity of the climate. They were about 600 miles farther south than at their old homes in England, but instead of finding a mild and even climate in the new home, they found greater cold in winter and greater heat in summer. They did not know that in New England the prevailing westerly winds make the climate continental (Sec. 27), while in England the west winds make the climate oceanic, with cooler summers and warmer winters.

Northern New England is colder than southern New England because of differences in altitude, in latitude, and in nearness to the sea. In the woods of Maine and in the uplands of New Hampshire and Vermont the winters are long, and there is a heavy cover of snow. Thick ice is formed on lakes and streams, and is cut and stored for summer use. The snow in the woods makes excellent roads for the lumbermen who cut logs and haul them to the streams. In the spring the snows melt and cause floods which float the logs down to the mills and to market. Along the coast, especially in the south, there is far less snow, and there is little sleighing. When the winds blow from the southeast in winter, they come from the warmer sea, and there is usually much moisture. A "northeaster" is dreaded because it comes from colder seas and is therefore intensely cold. The winds of such a storm are often violent and cause many shipwrecks.

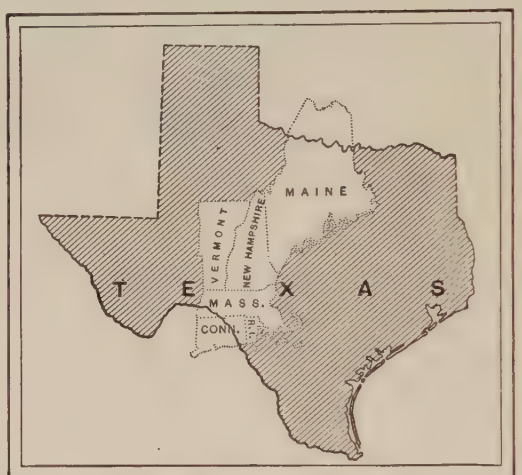

Fig. 90. Comparison of areas

Climate is even more important than soils in determining what crops will grow. The latest killing frost in spring, in New England, is likely to come late in April along the southern shores, and late in May in the north. The earliest killing frost in autumn varies from the middle of September in the north to the middle of November in the south. The average length of the crop-growing season is six months in the south and four months in the north, along the Canadian border. Thus New England has great variety in its climate.

84. Population.—The six states of New England are small in comparison with most other states. They are together about one and one half times as large as New York, and one fourth as large as Texas (Fig. 90). Their population at the time of the Fourteenth Census, in 1920, was nearly seven and one half millions. The three states of southern New England are much more thickly populated than the three states to the north, and more of their people live in cities and engage in manufacture and trade. The density of population for the several states is shown in Figure 80. For a long time most of the people of New England were descendants

of Englishmen, but in recent years many people from other lands have gone there to make their homes and engage in business.

Review.—1. Where are the lowlands of New England? The highlands? 2. What is the character of the hills in the lowlands?

3. Why has New England many lakes? 4. What do we find in place of some lakes of former times? 5. What is peat? 6. In what ways are lakes useful?

7. Why is the flow of New England rivers constant? 8. What is the cause of the rapids and falls in the rivers? 9. Name cities at which the falls are used for power. 10. What is a tidal river? 11. Name some New England rivers that are tidal in their lower courses. 12. What is the head of navigation on a river?

13. What is the general character of the New England shore line? 14. How does the shore of Cape Cod differ from that of Maine? 15. What are dunes? 16. What is sand binding? 17. What has made the southern shore line of New England so irregular? 18. Where an irregular shore line is formed in this way, what happens to the lower ends of river valleys?

19. How did the climate of New England bring disappointment to the first colonists? 20. What are the coldest parts of New England? For what reasons? 21. Describe the winters in northern New England. 22. What are the usual limits of the growing season in southern New England?

23. What is the density of population in Maine? In Rhode Island? Massachusetts? Connecticut? 24. Why should there be more people in southern than in northern New England?

Fig. 91. Bowlders left by the glacier

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Fig. 92. The Connecticut Valley

AGRICULTURE AND MANUFACTURE

85. Soils.—The ancient ice sheet spread over all of New England (Sec. 32). The ice stirred up the ancient soils that covered the land before the glacial time, and mixed with them much crushed rock and many stones (Sec. 31). On some hilltops and mountain summits nothing was left but bare rock. As New England has so many hills and mountains, the soil is thin over much of the country. Many of the stones brought by the glacier were large bowlders, which were left on the surface (Fig. 91). The steep slopes, thin soils, and bowlders are not favorable to the growth of crops nor to the use of many improved farming implements such as gang plows, grain drills, and harvesting machines.

Much of the good land is along the rivers and in the lowlands near the seashore. In Vermont and New Hampshire, the Connecticut Valley is narrow and has little farm land. But in Massachusetts and Connecticut the river flows through a broad lowland which has a good soil and a surface favorable for agriculture (Fig. 92).

86. Agriculture.—In the early days, New England was chiefly a farming region, and produced its own grain and meat. But when the rich soil of the states farther west was

Fig. 93. Milk wagons and trucks, Boston

brought under cultivation, general farming in New England became less profitable and began to decline. Some stony or steep fields have been allowed to grow up again to forest.

This does not mean that there is little agriculture in these states. Much land is tilled, and it is cultivated with great care. The towns and cities need vegetables. Hence market gardening is a flourishing industry. All the common hardy small fruits are raised, and many farms and small plots are used for dairying and poultry raising.

Railroad trains bring milk every day to Boston and many other large cities from nearly all parts of New England. The milk is then distributed by wagons and automobiles (Fig. 93). Hay, oats, and corn are grown in large quantities because forage crops are needed for horses and for herds of cattle.

Besides meeting these home needs, some special crops are raised where soil and climate are suited to them. Tobacco raising is an important industry in the southern part of the Connecticut Valley. The broad leaves of the plant as it grows in the fields, and the large barns for drying the crop, are a common sight in that region. Cranberries need swampy ground, and are raised on Cape Cod and in the adjoining region. The raising and canning of green corn and the growing of potatoes are extensive industries in Maine.

87. Manufacturing.—Several causes have made New England a manufacturing region. (1) There is much water power, the cheapest kind of power man uses. When the mill site has been bought, the dam built, and the water wheels put in place, the water of the stream from year to year costs nothing. When steam is used, the coal must be mined and usually must be carried long distances, which is expensive. In many cities of New England there is so much manufacturing that more power is required than the rivers can furnish. Coal is used for power, and comes by railroad from Pennsylvania and other states to Atlantic ports, where it can be loaded into barges (Fig. 94). These barges are towed by powerful tugs to Providence, Fall River, New Bedford, Boston, and other seaports of New England.

(2) New England is on the sea border, and has good harbors and extensive railroad systems. It can readily get the raw materials it needs, such as cotton, leather, and iron, and can readily send its goods to market.

(3) The invention of machinery accounts for the growth of manufactures, not only in New England, but also in other regions. In the early days, spinning and weaving were done by the women of each household, and the village cobbler made shoes by hand. But labor-saving machinery has been invented, most of it during the last hundred years, so

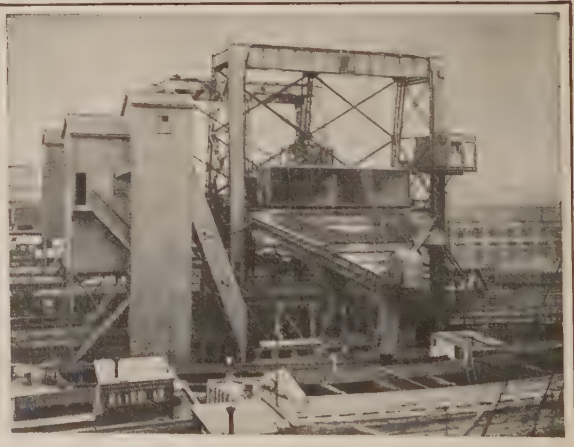


Fig. 94. Loading coal barges by machinery

that now one man can accomplish more than many men in the days of our ancestors.

This is true in agriculture and transportation as well as in manufacture. Ninety years ago it took 160 hours of one man's work to raise 50 bushels of wheat. Now not more than 8 hours of labor are required, because of the great plows, drills, and harvesters that are used. In 1865 it took 222 hours of work to make 10 pairs of men's high-grade calfskin shoes. With modern machinery, only 30 hours of work are needed to make the same number.

The chief manufactures of New England are cotton and woolen goods, leather goods, and a great variety of things made from the metals. Goods woven from cotton, wool, or other fibers are often spoken of as *textiles*.

88. The Cotton Industry.—More than one hundred years ago skillful men in England had invented machinery for spinning and weaving cotton. England did not allow any of these machines, or even any patterns of them, to be taken out of the country, because she wished to keep the business for herself. In 1789 Samuel Slater came to this country and settled in Rhode Island. Remembering how the English machines were made, he built some new ones, and in 1790 began to make cotton goods in Pawtucket, Rhode Island, a town which now has great cotton mills. In this way cotton manufacture began in this country.

Fig. 95. Weaving cotton cloth, Lowell, Mass.

Fig. 96. Machinery used in a textile school

Most of the cotton used in New England is raised in the southern states. It is pressed into bales of about 500 pounds each and comes by ship from Savannah, Mobile, New Orleans, and Galveston to the New England ports. Some of these ports, as New Bedford and Fall River, have cotton mills, so that many of the bales are unloaded close to the mills, while others must be carried inland a short distance by rail.

Many people are engaged in the cotton industry. A single mill may employ several thousand workers. French people from Canada and people from various European countries have come in large numbers to work in the mills. Textile schools have been established in New Bedford, Fall River, and Lowell, to prepare skilled workers for the industry (Fig. 96).

Calicoes, ginghams, and other cotton fabrics are made; also knit underwear, stockings, towels, handkerchiefs, and thread. From the mill the finished goods are sent to the wholesale and retail merchants in all parts of the United States, and to many foreign countries.

The great cotton-manufacturing centers of New England are New Bedford, Fall River, and Lowell in Massachusetts, Manchester in New Hampshire, and Pawtucket in Rhode

Island. There are large mills also in Taunton, Massachusetts; in Nashua, New Hampshire; in Lewiston, Maine; and in many other cities and towns.

89. The Woolen Industry.—Woolen manufacture in New England began long ago on the home farms. Later small mills were built in villages along the streams, and now much of the industry is concentrated in great mills in a few cities. At first the wool came from the New England farms, but now most of it is brought from the western states and from Argentina and Australia.

Fig. 97. Examining cloth in a woolen mill

Fig. 98. One room in a large watch factory, Waltham, Massachusetts

Lawrence in Massachusetts, and Providence and Woonsocket in Rhode Island, are centers of woolen manufacture, but many of the cities that make cotton goods make woolen goods also. The weaving of carpets is an important branch of the woolen industry, and especial attention is given to making the finer kinds, such as Brussels, Axminster, and Wilton.

90. Boots and Shoes.—The tanning of skins is an old industry in eastern Massachusetts. Men who knew how to make leather were among the first comers from England. Tanning is still done in towns near Boston, but much is done in Pennsylvania, New York, Wisconsin, and other states. Boston is the principal market for hides and leather. The hides come from the western states and from many countries in Europe, Asia, and South America.

Many common articles, such as traveling bags, pocketbooks, and harnesses, are made from leather, but its greatest use is for boots and shoes. In early days these were all made by hand, but now they are turned out very rapidly by machinery (Sec. 87). The region around Boston is the largest center of the manufacture of boots and shoes in the United States. This region extends to southern Maine and New Hampshire, notably in Manchester. The more important seats of the shoe industry in Massachusetts are Brockton, Lynn, Haverhill, and Boston. More than three fourths of all the business in Brockton and Haverhill is of this kind. Many shoes are now made in New York, St. Louis, Rochester, Cincinnati, Milwaukee, Chicago, and Philadelphia. American shoes are known for their excellence, and are sold all over the world.

91. Metal Manufactures.—No coal and not much iron is mined in New England, but large quantities of both are needed in the manufacture of steel rails, steel bridges, or the steel frames for tall buildings. Hence such things are not largely made in New England, but in places like Pittsburgh, where coal and iron are easily brought together. But firearms and other smaller articles that do not require very much iron are made in great quantities both in Massachusetts and in Connecticut.

The watchmakers in the factories at Waltham (Fig. 98), in Massachusetts, turn a small piece of steel into so many small screws or fine watch springs that it becomes worth thousands of dollars. With the steel they use brass and silver or gold, and turn out, ready for use, several thousand watches each day. In Providence, Rhode Island, and in Attleboro and other places in Massachusetts, much jewelry is made (Fig. 99). In many New England cities, particularly in Worcester, looms and other cotton and woolen machinery are manufactured. Wire making also is one of the industries of Worcester. In all these examples, — the watches, the jewelry, and the textile machines, — the amount of material used is small, but the time and skill required are very great.

The state of Connecticut has many factories in which small but valuable things are made of metals. Waterbury is a center for brass work, and for watches and clocks. Cutlery and silverware are manufactured in Meriden, and almost all kinds of hardware are made in various cities of the state, especially in New Haven, Bridgeport, Hartford, and New Britain.

92. Wood Pulp and Paper.—In the old days paper was made from rags gathered from homes and factories. For more than forty years, however, much paper has been made from wood, and now all newspapers and most books and magazines are printed on such paper. So much printing is done that rags can supply only a small part of the paper needed. The softer kinds of wood are used, particularly spruce. Maine, New Hampshire, Vermont, and New York have much spruce, and these states have become important in the wood-pulp industries. Much wood pulp is also imported from Canada.

Fig. 99. Jewelry factory in Providence

Fig. 100. A pulp and paper mill, Maine

The trees are felled, the bark removed, and the trunks cut into blocks about two feet long. The mills (Fig. 100), which often make both the pulp and the paper, are in or near the forests, usually where a waterfall supplies power. All the large rivers of New England float the logs and supply the power for pulp mills. The pieces of wood are ground by heavy machinery or boiled in acid to separate the fibers and make the pulp. The acid process leaves the fibers longer and makes the paper stronger than the method of grinding the wood. One mill in Maine makes 350 tons of paper from wood every twenty-four hours.

We can follow the process from the woodman's ax to the pulp factory, the paper making machines, and to the printing establishments in great cities where the paper is used for books, magazines, and newspapers.

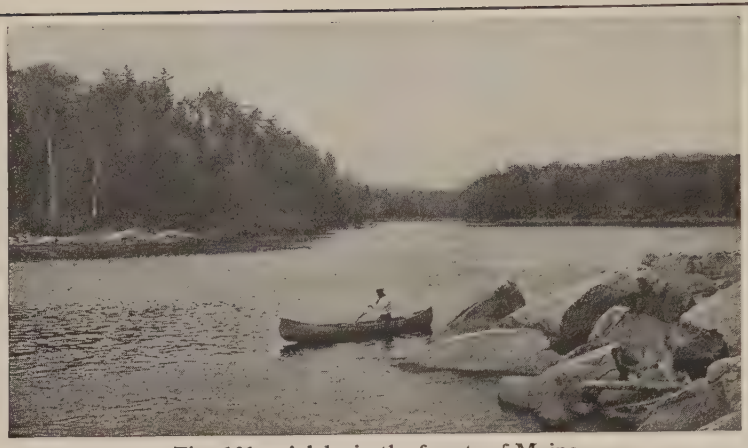


Fig. 101. A lake in the forests of Maine

Holyoke, on the Connecticut River in Massachusetts, has great paper mills and other industries, as the river here provides the largest water power in New England. The city is not near the forests, but the paper mills can thrive because the best grades of Holyoke paper are made from rags. Some of the rags come from New England mills, and some are imported.

All the paper used by the government for printing bank notes is made at Dalton in western Massachusetts.

We have now studied five kinds of New England manufactures, namely, cotton, woolen, boots and shoes, metals, and paper. Of these, paper is the only one for which the manufacturer finds much of the raw material at hand.

Review.—1. How did the ice invasion affect the soils? 2. Why is much of New England unfavorable to farming?

3. Compare the farming of former days with that of the present time. 4. How do towns and cities affect the work of the farmer? 5. What special crop is raised in the Connecticut Valley? 6. What crop is raised on Cape Cod?

7. Give the causes that have made New England a center of manufactures.

8. Who established the cotton industry in Rhode Island? 9. Where is most of the cotton raised? 10. Through what southern and what northern ports is it likely to come on its way from the plantation to the New England factory?

11. Where are textile schools established, and what is their purpose? 12. What is done with the cotton cloths, ginghams, and other fabrics after they are finished?

13. Name some of the centers of woolen manufacture. 14. What regions furnish most of the wool? 15. Name two kinds of woolen manufactures.

16. What is the chief market for hides and leather? 17. How has the making of boots and shoes changed? 18. What are the principal boot and shoe centers in New England? In other parts of the country?

19. What kind of manufactures of metals prevails in New England? Why? 20. What is the great industry at Waltham? 21. What metal industry is centered in Providence? 22. Name five Connecticut cities which have metal manufactures.

23. Give an account of wood pulp, the wood used, the process of manufacture, and the use of much of the paper. 24. Tell about paper making at Holyoke. 25. Where is the bank note paper of the government made?

OTHER INDUSTRIES

93. The Forests.—The early settlers found forests almost everywhere. Naturally they cleared the lowlands, the smoother and gentler slopes, and the lower hilltops. The rougher and higher ground was left in forest, and forms the "wood lots" of to-day. In northern New England in the Green and the White mountains, and stretching across Maine, there are still large forests (Figs. 101, 102).

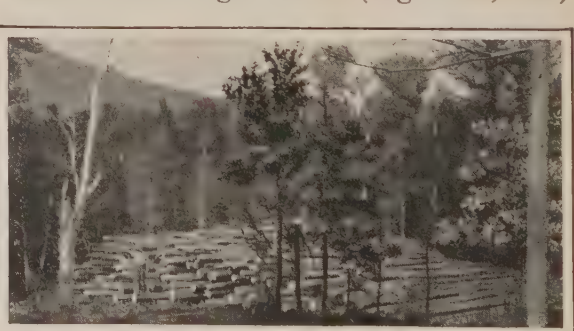


Fig. 102. A hardwood forest in Maine

The leaves, mosses, and black soil of the woodlands hold much of the rain water and allow it to flow gradually into the lakes and streams. If the trees were all cut away, the rains and melting snows would rush down the steep slopes, making floods in the lower river valleys, and leaving the rivers with little water in the dry seasons.

The people are now learning the value of the forests, not only for lumber, but also for preserving the water powers and preventing floods. Our government is purchasing some of the White Mountain forest for a *reservation*.

Pine, spruce, and hemlock are important kinds of soft wood found in northern New England, and among the hardwoods are oak,

Fig. 103. Hauling maple sap to the sugar camp

ash, maple, and birch. Lumbering is much less extensive than in former times, but is still an important industry in Maine and in parts of New Hampshire and Vermont. Much more lumber is now cut in the South and West than in New England, but, with proper care, the New England forests will always produce lumber for local use and supplies of firewood and pulp wood.

The forests furnish material for many manufactures. Among these are bobbins, spools, and crates and boxes for shipping to market the products of the mills. Pails, rakes, clothespins, toys, and many other common objects and novelties are made, and large amounts of lumber are used for building or are made into furniture.

Maple sugar is an important product of

Fig. 104. A lumber camp, New Hampshire

the forests in Vermont, which has first place in this industry. The sap of the sugar maple, in its first days or weeks of flow in early spring, is caught in buckets, and boiled in large kettles or pans until it forms sirup or sugar. The tapping of the trees in the " sugar bush," the gathering of the sap among the lingering snows (Fig. 103), the boiling and " sugaring-off " of the sugar camp, make an interesting chapter in the life of many Vermont farmers.

The forests affect the life of country and city in many ways. The lumber camp in the deep snows of winter is a place of hard toil and rough and ready fun (Fig. 104). The "driving" of the logs in the flooded streams of spring is a work of much hardship and danger (Fig. 105). Down the stream at some convenient point the logs are collected in a pond, and wait to be pulled into a mill and cut into lumber or made into wood pulp.

By a waterfall on some small stream a factory may be built to make spools or clothespins. Or, in some large town or city at tide-

U. S. Dept. of Ag., Forest Service

Fig. 105. Rafting logs in the Penobscot River

water, the lumber is not only sawed, but much of it is worked up into moldings, window frames, doors, or flooring, to be shipped to Boston or some other port. Bangor and Augusta in Maine are downstream from great forests and have water power for sawmills and factories; and they can ship lumber and its products directly by water.

Fig. 106. At the bottom of a marble quarry

94. Quarrying.—Many of the rocks of New England are so hard and so compact that they can be cut into blocks and slabs and used for building and other purposes. The most widespread and important rock in this region is granite, which is hard and enduring, and is used for buildings, for monuments and tombstones, and for paving and curbing. New England granites are usually of a gray color. There are large granite quarries in Milford and Quincy, Massachusetts; Westerly, Rhode Island; Barre, Vermont; and Concord, New Hampshire. There are many fine granite quarries in Maine.

Marble is quarried in the Green Mountains in Vermont, in the Berkshire Hills in western Massachusetts, and in Connecticut. The industry is largest in Vermont, which ranks first among the states in this product. Rutland and Proctor are the chief centers. Here enormous pits have been made by the removal of marble (Fig. 106), and great yards and sheds are filled with the blocks to be dressed and made ready for shipment (Fig. 107). Marble is used for the walls of buildings, for interior decoration, and for tombstones. Being softer than granite, it is more easily shaped, and hence, from ancient times until now, has been much used by sculptors, especially to represent the human form.

Slate is a rather hard, fine-grained rock that splits into thin sheets or slabs, and is useful for roofing, for school slates and blackboards, and for mantels and other furnishings. Slate is quarried in western Vermont and in Maine. Red and brown sandstones are found in the Connecticut Valley, and were formerly used in the brownstone fronts of city houses, and for various building purposes.

Fig. 107. Marble blocks ready for shipment, Proctor, Vt.

Stone of all these kinds is shipped not only to towns and cities in New England, but also to other states. Many of the granites are quarried near the sea and go by ship. This is usually the cheapest way for any freight that is as heavy and bulky as stone. Nearness to large markets and good transportation facilities make quarrying a large industry in New England.

Fig. 108. Drying codfish at Gloucester

95. The Fishing Industry.—The New England coast waters abound in fish, and a few hundred miles to the east are the shallows called the Banks of Newfoundland. Europeans have fished there for more than four hundred years. The region is crossed by steamers plying between America and Europe, and fogs and icebergs are dangerously common there.

Although fishing is still an important New England industry, some shore towns have changed their business from catching and packing fish to manufacturing. Sailors from New Bedford and Nantucket at one time went out on sailing voyages of three or four years to distant oceans to catch whales, but New Bedford is now best known for cotton mills, and Nantucket as a summer resort.

Boston and Gloucester are the great fishing centers of New England, and are among the greatest in the world. Several hundred schooners sail from New England ports to the Banks of Newfoundland, where cod and halibut are found. The fishing is done by means of dories, small boats that put off from the schooner, each with one or two men. The fish are dressed on board and packed in ice, or salted, and the schooner, when loaded, returns to Boston, Gloucester, or it may be, to Portland or some other fishing center.

Cod and halibut live in waters of some depth and must be caught with hooks. Mackerel swim in schools through the surface waters and are caught with huge nets. Lobsters are caught in traps near the shore, especially along the coast of Maine. Oysters are common on the south shores, and many are shipped from shore towns. Along the shores of Maine many small herring are canned and sold as sardines. The canning of fish and other sea foods is an important industry in eastern Maine.

96. Scenery and Summer Resorts.—In summer the sea is cooler than the land (Sec. 27). New England has many rocky coast cliffs and smooth sandy beaches, and many thousand people seek the sea border in the heat of summer, because it is cool and because of the good bathing and fishing and boating. Newport in Rhode Island is one of the best known seaside resorts. It has an excellent harbor frequently visited by ships of the United States Navy. Bar Harbor on Mt. Desert Island is also well known (Fig. 109).

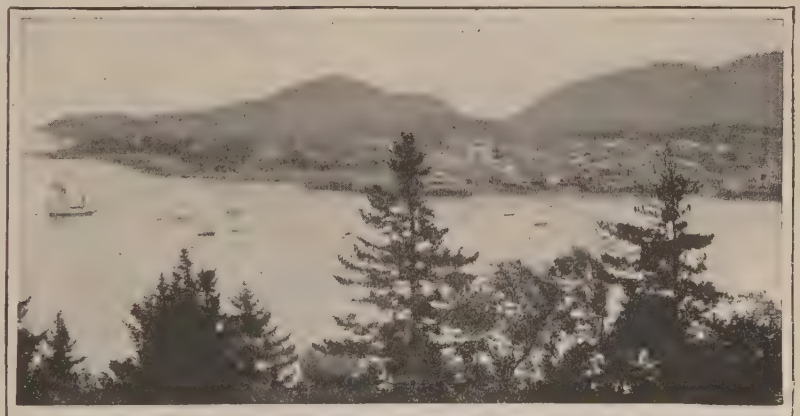


Fig. 109. Bar Harbor, Maine

Mountains are cooler than lowlands (Sec. 26), and the New England mountains have forests and clear air far above the smoke of towns; they also offer noble views of woods, fields, lakes, and sky. Hence, in summer, thousands of people go to these mountains, seeking rest.

In the wide forests of Maine are many lakes, joined by streams. Here the tourist can canoe for long distances, and can camp, hunt, and fish. The New England shores, mountains, streams, lakes, and forests attract many, not only from the cities and towns near at hand, but also from cities far to the westward.

Fig. 110. Yard of Harvard University

Fig. 111. The Memorial Quadrangle, Yale University

A great number of New Englanders find occupation in managing hotels and boarding houses, building and renting cottages, raising the needed vegetables and fruit, making and sailing pleasure boats, and carrying the tourists in wagons, cars, and automobiles. In these ways the natural scenery helps some of the New England people to earn their living.

97. Education.—Universities, colleges, academies, and public and private schools flourish in New England. The people from early days have had the advantage of education and have been influential in the affairs of the nation. They were prompt to resist the unjust taxes that led to the Revolution, and to fight when it became necessary. From New England many sturdy men and women migrated to New York and to the states of the Mississippi Valley, and have been influential in shaping the life of some of the greatest states and cities in the Union.

In Massachusetts, at Cambridge, is Harvard, the oldest of American universities (Fig. 110). It was founded in 1636, and was endowed by John Harvard, a graduate of the University of Cambridge in England. Also in the same state are the Massachusetts Institute of Technology, a number of colleges for men, and several of the best known colleges for women. Yale University, at New Haven, Connecticut (Fig. 111), was founded in 1701; and there are in the various New England states many other well-known colleges.

Review.—1. Where are the principal forests of New England? 2. Why should they be preserved? 3. What are some of the useful things made from New England trees? 4. What special product is made in some of the forests in Vermont? 5. What cities in Maine have a large lumber business? Why is their location favorable?

6. What are the chief kinds of useful rock in New England?

7. Give an account of the Banks of Newfoundland. 8. Name the chief New England fishing centers. 9. How does cod fishing differ from mackerel fishing?

10. What kinds of scenery are found in New England? 11. How does the dense population of the eastern states affect summer resorts? 12. Of what practical value is this to many people of New England?

13. What is the principal university in Massachusetts? In Connecticut?

CITIES AND ROUTES OF TRADE

98. Boston.—The largest of New England cities is Boston. Many other large places are within a few miles of Boston, and "greater Boston," or the Metropolitan District, as the region is sometimes called, has far more than a million people. Cambridge has over 100,000 inhabitants; Lynn, the shoe town, has about 100,000. The Metropolitan District includes also Somerville, Malden, Newton, Everett, Quincy, Chelsea, Waltham, Brookline, and other cities and towns (Fig. 112). Some of the cities are places of residence for the business men of Boston.

Boston is one of the most important seaports of the United States. Coasting steamers run to all points on the New England coast, to the ports of Canada, and to New York, the West Indies, and the Gulf of Mexico. Several lines have regular sailings to Great Britain and other foreign countries. Cotton from the southern states, fruit from the tropics, and hides from many countries are among the commodities landed on Boston wharves. From Boston are sent many of the manufactured products of New England. The city is also a shipping point for grain from the western states.

© *Ewing Galloway*

Fig. 113. State House, Boston

Salem, like Boston, is an old seaport, and many years ago ships from all parts of the world brought rich cargoes to its wharves. Boston grew faster and gained the shipping trade partly because it has a better and more commodious harbor than Salem, more suitable for modern ocean steamships. Boston is also at the most western point on Massachusetts Bay, and from Boston railroads were built across the Berkshire Hills to Albany and the West. After Boston secured the advantage in size and business, other railroads were built leading to it, so that now roads run from Boston to the city of New York, to the West, and to all points in northern New England and eastern Canada. Southern New England is covered by a close network of railroads. One of the roads passes through the Hoosac Mountain by a tunnel about five miles long,—the longest railroad tunnel in this country.

The canal across Cape Cod from Buzzards Bay to Cape

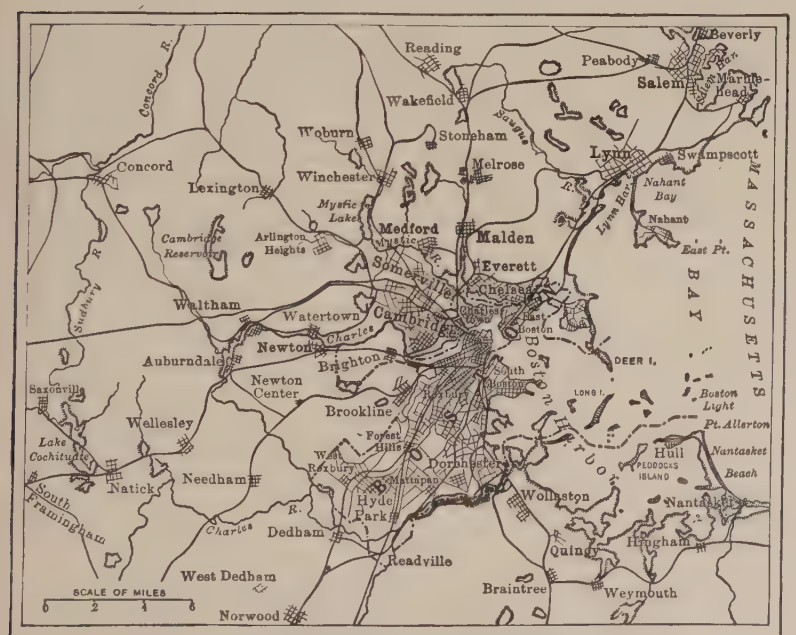


Fig. 112. Boston and vicinity

Cod Bay shortens by several hours the sea route from Boston to southern points.

Boston is the financial or banking center of New England. The companies that operate mills and factories in the smaller cities have their main offices in Boston. Through these offices they buy their raw materials, such as wool, cotton, or leather, and also make sales of cotton cloth, worsteds, shoes, and other finished products. Boston has many dealers in wool, and only London is greater as a wool market.

Boston is a place of much interest to Americans, for it was the scene of many events in the Revolution. Bunker Hill is in the city, and Lexington and Concord are near it. The Old South Church, the State House (Fig. 113), and Faneuil Hall are among the historic buildings of America.

99. Other Cities.—Westward from Boston is Worcester, the second city in the state and the third in New England, with many manufactures besides those named in Section 91. Springfield is the principal city of the Connecticut Valley in Massachusetts, and is the banking and trade center for many smaller cities and towns in the neighborhood. Here the Boston and Albany Railroad is crossed by the railroad lines of the Connecticut Valley. Pittsfield, with large factories, is the chief city of the Berkshire region. Fitchburg in central Massachusetts is a place of many kinds of manufacture.

Portland is the chief city of Maine. It is a trade center for the manufacturing cities of the state, has an excellent harbor, and sends steamships to Boston, to other American ports, and to Liverpool. The Grand Trunk Railway of Canada reaches the sea at Portland, and thus has an outlet in the winter months, when most of the Canadian ports are closed by ice. New Hampshire has one good harbor, at Portsmouth. Vermont has no seacoast, but Burlington is a port on Lake Champlain.

Providence, in Rhode Island, the second city of New England, has railroad connections with Boston and New York, and a large coasting trade. Fall River in Massachusetts, and New Haven, Bridgeport, and Hartford, all in Connecticut, are ports engaged in coastwise trade.

Review by States.—Maine. 1. How does Maine compare with your state in area? In density of population (Fig. 80)? 2. What kind of coast line has Maine? 3. Which city is the capital? 4. Name three other cities of Maine and mention their important industries. 5. Which is the largest city? 6. Where do its steamships go? 7. What great railroad connections has it? 8. In what way is it important to the other cities of Maine? 9. What kinds of fishing prevail along the coast? 10. What well-known summer resort is on Mt. Desert Island?

New Hampshire (N. H.). 11. What seaport has New Hampshire? 12. How long is its seacoast (see Fig. 84)? 13. What is the principal river? 14. Give name and location of the capital. 15. What city is farther south on the same river? What are its two chief industries? 16. What mountains are to the northward?

Vermont (Vt.). 17. Name a river and a lake on the boundaries of Vermont. 18. What mountains are in Vermont? 19. At what place is granite quarried? 20. Where is marble found? 21. What other useful stone is found in Vermont? 22. Name the capital; the chief lake port.

Massachusetts (Mass.). 23. What are the great industries of Massachusetts? 24. Name the principal cities for each of the greater industries. 25. Give an account of the foreign trade of Boston; of its railroad connections. 26. Make a sketch map of the state, showing the location of Worcester, Springfield, Lowell, Lynn, Waltham, Gloucester, and Fall River. 27. What are the industries of each of these cities? 28. Where is the Hoosac tunnel?

Rhode Island (R. I.). 29. What is the density of population of Rhode Island? 30. What bay runs far inland? 31. What is the rank of Providence among the cities of New England? 32. What seaport and summer resort is on an island in the southern part of the state? 33. Where is granite quarried? 34. What important city in Massachusetts is approached through Narragansett Bay?

Connecticut (Conn.). 35. What is the capital of Connecticut? 36. What is the character of the Connecticut River up to this point? 37. Name the chief seaports.

Fig. 114. The *Half Moon*,—photograph of a replica of the ship in which Henry Hudson crossed the Atlantic Ocean

THE MIDDLE ATLANTIC STATES

100. Early Settlements.—As has already been pointed out, the real reason why Columbus undertook his voyage across the terrifying sea that stretched for an unknown distance west of Europe, was to try to reach Asia by sailing west.

Long before his time, the people of Europe had carried on an overland trade, by caravan, with some of the people of Asia. The fine silks and metal goods, the gold and silver ornaments, the jewels, the spices, perfumes, and dyes which came from these eastern countries were highly valued in European markets.

Practically all of the caravan routes crossed territory under the control of the Turks. When these people decided upon a war against those of their neighbors who did not believe as they did, trade could no longer be carried on across their territory. The closing of these routes of trade made it necessary for the merchants of Europe to find other routes to these eastern countries, and the voyage of Columbus was one of the attempts to find a water route. He found a New World instead, but he died without knowing that he had done so.

After the voyage of Columbus many other such attempts were made. Several of them were made by Henry Hudson, an Englishman in the service of the Dutch. On one of his trips, Hudson reached the coast of the New World, entered the river which now bears his name, and sailed for a long distance up the stream. As a result of this expedition the Dutch laid claim to the surrounding territory and made several settlements. One of these was at New Amsterdam, a name that was changed to New York when the country came into English hands. This settlement, with others adjoining it, has come to be the largest center of population in the world. The early settlements in Pennsylvania and New Jersey, however, were made by the people of Great Britain and Germany.

In the Middle Atlantic States, as in New England, agriculture is still an important industry, but the leading industry, and the one which gives employment to the greater part of the vast population, is manufacture.

Fig. 115
Physical and Political
MIDDLE ATLANTIC STATES
Scale of Statute Miles
0 10 20 30 40 50 100
62 MILES TO ONE INCH
Capitals of Countries thus: ◉ Capitals of States thus: ⊙
ELEVATIONS IN PEET
OVER 5000
2000 TO 5000
1000 TO 2000
500 TO 1000
SEA LEVEL TO 500
COPYRIGHT, BY AMERICAN BOOK COMPANY
Same Scale as Main Map
Longitude West from Greenwich
THE MATTHEWS-NORTHRUP WORKS, BUFFALO, N.Y.
LAKE ONTARIO
LAKE ERIE
ELEVATION 247 FEET ABOVE SEA LEVEL
ELEVATION 573 FEET ABOVE SEA LEVEL
ATLANTIC OCEAN
LONG ISLAND
Adirondack Mountains
Allegheny Mts.
Blue Mts.
Kittatinny Mts.
Catskill Mts.
Shawangunk Mts.
Highlands
Palisades
Delaware Bay
Chesapeake Bay
Susquehanna R.
Delaware R.
Hudson R.
Mohawk R.
Genesee R.
Allegheny R.
Ohio R.
Potomac R.
Erie Canal
Welland Canal
Chesapeake and Delaware Canal
Cape May
C. Henlopen
Barnegat Inlet
Sandy Hook
Montauk Pt.
Thousand Islands
Saranac Lakes
Lake Champlain
Lake George
Schroon L.
Oneida L.
Keuka L.
Cayuga L.
Seneca L.
Conneaut L.
Chautauqua L.
Raritan Bay
Newark Bay
Jamaica Bay
Gravesend Bay
Upper New York Bay
Lower New York Bay
Arthur Kill
Kill van Kull
Staten I.
Manhattan
Brooklyn
Queens
Bronx
Jersey City
Newark
Yonkers
Paterson
Trenton
Camden
Philadelphia
Wilmington
Baltimore
Washington
Annapolis
Harrisburg
Pittsburgh
Buffalo
Rochester
Syracuse
Albany
Troy
Utica
Scranton
Wilkes-Barre
Reading
Lancaster
Erie
Toronto
Hamilton
Ottawa
Montreal
Kingston
Niagara Falls
Lake Placid
Whiteface Mt.
Mt. Marcy
Mt. Washington
Mt. Carmel
Mt. Pocono
Mt. Holly
Mt. Kisco
Mt. Vernon
Mt. Airy
Mt. Union
Mt. Pleasant
Mt. Lebanon
Mt. Oliver
Mt. Jewett
Mt. Jackson
Mt. Jewett
Mt. Jackson
Mt. Jewett
Mt. Jackson

THE MIDDLE ATLANTIC STATES

	Area, Sq. Mi.	Population, 1920	Capital
New York	49,204	10,385,227	Albany
New Jersey	8,224	3,155,900	Trenton
Pennsylvania	45,126	8,720,017	Harrisburg

Map Study.—1. What are the states of the Middle Atlantic group? 2. Name the rivers and lakes that form parts of the boundary of New York. 3. What natural boundaries has Pennsylvania? New Jersey?

4. What three rivers flow southward to the Atlantic Ocean? 5. By what stream does New York send waters to the Gulf of Mexico? 6. What river rises in Pennsylvania, crosses New York, and flows into Lake Ontario? 7. What important city is on this river?

8. Trace the Delaware River from its source to the ocean. 9. Describe the Susquehanna River in the same way. 10. What state capital is on this river? 11. What state capital is on the Delaware River? 12. What other large cities are on this river? 13. What state capital and other large cities are on the Hudson River? 14. What canal connects Lake Erie and the Hudson River? Name seven important cities on or near it. 15. What great city is at the head of the Ohio River?

16. What mountains are north of the Mohawk River? What highland is south of it? 17. How long is Long Island? 18. Name the four largest lakes within New York state.

PHYSICAL FEATURES

101. Size and Position.—The three states, New York, New Jersey, and Pennsylvania, together contain a little more than 100,000 square miles, and are therefore smaller than the single state of Colorado. They have, however, more than 22,000,000 people, while Colorado has less than 1,000,000.

Fig. 116. The hilly lowland of northeastern New Jersey

On their southeastern border is the Atlantic Ocean, with the great and safe harbors of New York and Philadelphia. On the northwest this group of states is bounded by Lake Erie, Lake Ontario, and the St. Lawrence River. Here are Buffalo and Erie, ports of Lake Erie. In the west are the headwaters of the Ohio River, and here is Pittsburgh.

These states have the advantage of three vast systems of waterways, namely, (1) the Great Lakes, leading to Chicago and Duluth; (2) the Ohio River, connecting with the whole Mississippi system and the Gulf of Mexico; and (3) the ocean, the highway to all the world. In addition New York and Philadelphia are the eastern terminals of some of the greatest American railroad systems.

All three states were among the original thirteen colonies, and as they were settled at an early time, they have the advantage of long growth. They are like New England in having many cities, great markets, special crops on the farms, and extensive manufactures.

102. Surface.—There are four physical regions in this group of states.

The first of these regions borders the ocean and is called the *Atlantic Lowland* (Sec. 47). Part of it is hilly lowland, which was once much higher than now and has been worn down to its present form. This hilly region includes the southern corner of New York state, with Manhattan Island; also northeastern New Jersey and southeastern Pennsylvania. Southern New Jersey is low and flat, its rocks are clays and sands and marl beds, and it is a part of the uplifted sea bottom that now forms the Atlantic coastal plain (Sec. 47). New Jersey is mainly lowland.

© Major Hamilton Maxwell

Fig. 117. Bathing beach, piers, and large hotels, Atlantic City

Long Island is a part of the state of New York. It is more than 100 miles long. It is mainly flat, but in some places it is hilly with glacial moraines, for the glacier reached across the region where Long Island Sound now is. Long Island, however, is like the coastal plain rather than the hilly lowland.

Nearly all the sea border of this group of states is low and sandy. Great cities are near, and there are many resorts and bathing beaches, such as Atlantic City (Fig. 117) and Long Branch in New Jersey, and Coney Island and Rockaway Beach on Long Island. There are thousands of summer homes on the shores of Long Island.

The second physical region in this group of states is a part of the *Appalachian Mountains* (Sec. 48), and contains several groups of highlands. The Adirondacks are a forested region in northern New York, with beautiful lakes and many peaks from 3000 to 5000 feet in altitude. The highest is Mt. Marcy, whose top is 5344 feet above the sea. A large part of this region is a state forest preserve.

East of the Hudson are the foothills of the Berkshires, and farther south are the Highlands of the Hudson, through which the river has cut a gorge from Cornwall to Peekskill. West of the Highlands are the Shawangunk (pronounced shon'gum) Mountains. Northwestern New Jersey is a region of wooded highlands, with forests and iron mines. Having few people and no large towns, these uplands furnish pure water for the cities of northern New Jersey.

Through Pennsylvania, from the Delaware River on the northeast, a number of long, even-topped mountain ridges extend across the state southwest into Maryland and West Virginia. The Susquehanna River cuts through the whole series of ridges north of the city of Harrisburg. Within this mountain belt are beds of hard coal, or anthracite.

The third region is the northern part of the *Appalachian Plateau* (Sec. 49). In eastern New York it is called the Catskill Mountains. Their steep cliffs look down on the Hudson Valley. The higher slopes of the Catskills are a region of bold forest-covered hills, some of the higher peaks rising to 3000 or 4000 feet above the sea. Being high, cool, and near large cities, these hills are the sites of many summer homes and hotels.

Westward from the Catskills the hills are about 2000 feet above the sea, and extend through central and southern New York almost to Lake Erie. Deep valleys run among the hills, and in some of them there are beautiful lakes. One of these, Otsego Lake, is the source of the Susquehanna River. At the foot of the lake is Cooperstown, once the home of James Fenimore Cooper, the novelist. In west-central New York are some long, narrow lakes occupying valleys which were much changed by the great glacier that once swept over this region (Sec. 31). The largest of these lakes are Oneida, Seneca, and Cayuga.

In Pennsylvania the plateau occupies all of the state northwest of the mountain belt. As in New York, there are many deep valleys. The largest of these are the valleys of the Allegheny and Monongahela rivers, which unite at Pittsburgh to form the Ohio. This plateau in Pennsylvania is often called the Allegheny Plateau (Fig. 118). In this region there are great beds of soft coal, and much petroleum and natural gas.

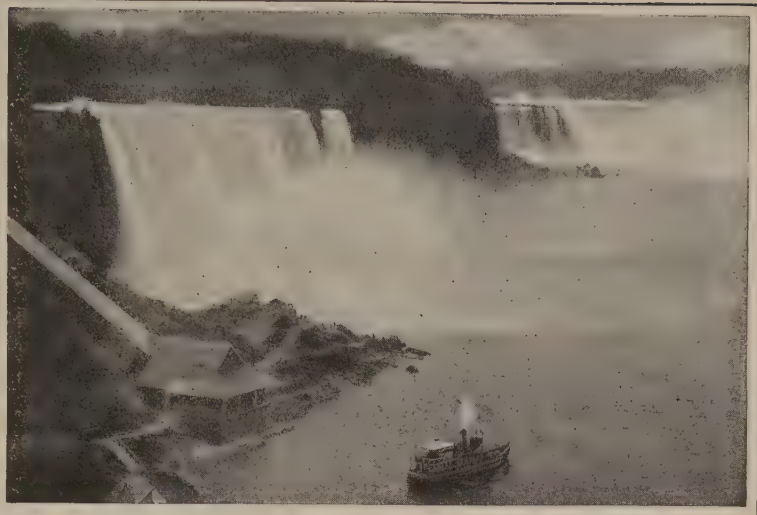


Fig. 119. Niagara Falls, seen from the New York side

The fourth region is the lowland bordering the Great Lakes, often called the *Lake Plains* of New York. Lake Ontario and Lake Erie were once much larger than now, and overflowed all the lowlands that now border the lake shores. On these lowlands mud gathered, forming a level deposit which, when the waters went down and plants grew, became good soil. The fruit and grain farms on the Lake Plains are among the richest in New York state.

103. Drainage.—The principal streams of the Middle Atlantic States are:

(1) The St. Lawrence river system, including Lake Erie, Lake Ontario, and many streams from northern and western New York. It also includes the Niagara River, between New York and Canada. This river is very short, but has the great falls which are the wonder of all nations (Figs. 22, 119).

(2) The Ohio, with headwaters in West Virginia, Pennsylvania, and New York.

(3) The Susquehanna. Its main source is in Otsego Lake, but it has many sources in the plateau regions of New York and Pennsylvania. The river passes through the mountains, crosses the Atlantic Lowland, and enters the Chesapeake Bay.

(4) The Delaware. This stream rises in the Catskills, and flows between Pennsylvania and New Jersey (Figs. 54, 120), into Delaware Bay.

(5) The Hudson and its large branch the Mohawk. The Hudson is a tidal stream,

Fig. 118. A valley (Allegheny River) in the Allegheny Plateau; Oil City, Pennsylvania

Fig. 120. The Delaware River above the Water Gap

Fig. 121. Looking up the Hudson River from West Point

and is navigable as far as Albany and Troy, 150 miles from the sea (Fig. 121). The Mohawk Valley is an open highway leading westward between the Adirondacks and the Appalachian Plateau.

Review.—1. What great systems of waterways are partly in these states? 2. Trace the journey by water from Buffalo to the Atlantic Ocean by two routes. (On questions 2, 3, and 4 use the maps of North America and the United States.) 3. Describe the water route from Pittsburgh to the Gulf of Mexico. 4. Outline the water route from Buffalo to Duluth. 5. How do the Middle Atlantic States resemble New England?

6. Name the regions as classified by surface, beginning on the Atlantic side. 7. Describe Long Island. 8. Where are the Highlands of the Hudson? 9. What is the character of northwestern New Jersey? 10. In what way is this region useful to many people? 11. Describe the course of the mountain belt across Pennsylvania. 12. What is the Appalachian Plateau called in eastern New York? 13. What streams drain the plateau in Pennsylvania? 14. What is meant by the Lake Plains in New York?

SOILS

104. Kinds of Soil.—There are several kinds of soil in different parts of the Middle Atlantic States. In order to understand them, let us first consider what soils are and how they are made. A soil is fine, earthy matter in which plants will grow. It may be mixed with coarse or even stony materials, or it may be entirely fine and free from stones. If the soil is sandy, the farmer calls it a light soil. Water readily drains out of such soils, and plants growing in them often suffer from lack of moisture. Sandy soils are in many cases less fertile than others. If the soil is clayey, the farmer calls it heavy. Sometimes it holds too much water, and care must be taken not to work it when it is wet, or it may bake under the sun's heat into hard lumps. If the soil is a mixture of sand and clay, it is a loam. Many of the soils that are the most productive are loams.

105. Origin of Soils.—All rocks, when exposed to the air, to water, or to heat and frost, slowly break into small pieces. Such breaking up is called *weathering*. Also the wear of rivers, glaciers, and waves makes much rock waste. The surface parts of the crushed and decayed rocks become covered with trees, grasses, and other plants. Then the roots and tops decay and mingle with the rock waste. Such a mixture of rock and plant matter is a soil. When a ditch or a cellar is dug, the material found at the top, which is dark in color and is filled with roots, is the soil layer. It may be several inches in thickness, or several feet, as is true of some prairie soils in the Mississippi Valley.

The ice of the glacial invasion (Sec. 32) covered nearly all of New York, all of northern New Jersey, and part of northern Pennsylvania. Wherever the ice moved, it mixed the soils that were already there with rock waste which it had gathered in its progress. Hence glacial soils are a mixture of what might be called home and foreign material. Indeed some of the soil material in New York was brought from Canada by the ice as it came southward.

Where there has been no glacial invasion the home rock weathers and decays in its place. The fragments may slip down hill, but they do not go far. Soils in such regions are made from the rocks which lie below the surface. There are exceptions to this rule; rivers and winds carry soil materials long distances from the rock formations from which they were made.

Soils made by decay in place are found in central and southern Pennsylvania and in southern New Jersey, as well as in many other parts of the world.

There are many special kinds of soil, as mucky, volcanic, or silty. Mucky soils consist mainly of decayed vegetation. Most lavas break up quickly into volcanic soils. In some regions the winds work over the fine rock waste left by rivers and glaciers or

formed by the decay of rock in place, and make a silty or *loess* soil such as is found on some of our prairies and in other parts of the world.

106. Management of Soils.—The soil on which most crops are raised needs to be cultivated during the growing season. This stirring of the soil not only kills weeds, but helps to keep the ground moist, as the ground water will not evaporate quickly through the layer of loose soil.

To be most successful with crops, the farmer must know how to manage soils. If the ground is too wet, he must drain it. If it is too dry, he must keep the soil under constant cultivation, plant crops that require less moisture, or irrigate the ground. He must understand the rotation of crops; that is, he must not plant the same crop on the same ground year after year, for this will always take the same kinds of plant food out of the soil and may exhaust the land. He must also use the right kind of fertilizers.

The wise farmer leaves forests, or grass for pasture, on the higher lands and steeper slopes, for these are harder to work, and if the soil is turned with the plow and made fine with the harrow, the rains wash away the best of it and ruin the surface with gullies (Fig. 122). When he plows a sidehill, he works around or across it so that the rains cannot wash the furrows. In some of the older countries, as in Palestine, in Italy, and along the steep slopes of the Rhine Valley, the land has been terraced, to make strips of flat or gently sloping ground for the cultivation of grapes and other fruit. The necessary soil is sometimes brought from a distance. The soil is the most precious gift of nature, and it takes much wisdom both to use it well now and also to preserve it for the use of future generations.

Photo by H.C. Ayres, U.S. Forest Service

Fig. 122. A hillside, showing gullies

CLIMATE AND AGRICULTURE

107. Climate.—The Middle Atlantic States are in the track of the great westerly winds (Sec. 61). They border the ocean, and as the cyclonic storms cross them, the winds blowing toward the storm center from the south and east contain much moisture evaporated from the surface of the sea. For this reason there is enough rain over the entire region, but it is heavier near the sea. The rainfall is about 45 inches in the city of New York, on Long Island, and in the coastal parts of New Jersey; and about 40 inches in Philadelphia. The amount becomes less as we go inland, until we reach the borders of the Great Lakes, where we find about 35 inches; but in the higher regions of the Adirondack and Catskill mountains it again increases (Fig. 72).

The climate of the whole coastal region is made milder by the nearness of the ocean. The interior uplands, especially in the Adirondacks and in southwestern New York, have very cold winters and much snow. Frosts there may come as early as September and linger into May. Along the Great Lakes and the large lakes of west-central New York, however, the winters are less severe, and grapes, peaches, and quinces are raised in abundance. Long Island, southern New Jersey, and southeastern Pennsylvania have rather mild winters. The chilling of the damp ocean air when it reaches the land often causes heavy fogs at New York and Philadelphia, and ships must sometimes wait until the fog disappears before they can come to port or sail from it.

Fig. 123. Truck farm on Long Island

Fig. 124. Apple orchard in western New York

108. The Wheat Crop.—The Middle Atlantic States raise all the grains that flourish in a temperate climate, such as wheat, corn, barley, oats, rye, and buckwheat. The population is large; more people live in towns and cities than on farms, and their work is chiefly in trade and manufacture. On account of this dense population much of the bread supply is brought from the western states, as is the case in New England. The Middle Atlantic States, however, raise much wheat, while the New England States produce very little.

Pennsylvania raises many million bushels of wheat, though less than a number of states in the western part of the country.

New York averages not far from one bushel of wheat for each one of its population. Since each person on the average consumes about six bushels of wheat in a year, we can see that most of the wheat used in New York must come from outside the state. Western New York was once the wheat center of the United States, and Rochester was then called the Flour City because of the large flour mills operated by the Falls of the Genesee River at that place. Now the farmers on the prairies and plains of the West can raise wheat more cheaply than can the farmers of New York state.

109. Vegetables and Fruits.—The farmers of the Middle Atlantic States, like those of New England, raise special crops for the city markets. All along the Atlantic Lowland, in Pennsylvania, New Jersey, and on Long Island, *truck farming*, or market gardening, is a great business (Fig. 123). Millions of people in the cities of the lowland must be supplied with common vegetables and small fruits. The Hudson Valley also is a good place for market gardening because there are many cities along the river and the city of New York is at its mouth.

Grapes and peaches are among the fruits that flourish in the coastal lowlands, in the Hudson Valley, and along the lakes of western and central New York. The lake waters store the heat of the summer sun, and slowly give it off during the autumn. Killing frosts do not come until late in October, and the fruit has plenty of time to ripen. Many apples are grown in western New York (Fig. 124) and in the Hudson Valley, and they are the chief orchard fruit in Pennsylvania.

The fruit crop of New York is greater in value than that of any other state except California. In the western part of the state, along the shore of Lake Ontario and bordering the Niagara River, is one of the greatest fruit-growing regions in the United States.

Fig. 125. A vineyard in the Chautauqua Grape Belt

Along the shore of Lake Erie in western New York and northwestern Pennsylvania is a region of vineyards known as the Grape Belt (Fig. 125). Grapes are grown in large quantities also near Keuka, Seneca, and other lakes in west-central New York. Some grapes are sold in baskets, as a table fruit, while many are used in the manufacture of grape juice.

Among the special crops are hops and onions in parts of New York, tobacco in southeastern Pennsylvania, and sweet potatoes in southern New Jersey. The common potato is raised almost everywhere.

110. Dairying.—People in cities must have daily supplies of milk, cream, and butter; hence dairying has become the most common industry on the farms of these states. Milk is carried to the city of New York by daily milk trains, many of which run from western and northern New York and from the shores of Lake Ontario. There are milk stations along the railroads. Some are near the regular passenger and freight stations, and others stand by themselves, at points convenient to the farms. The farmer drives to the milk station each day, sometimes taking the milk cans of his neighbors as well as his own. At the station the milk is weighed, and loaded in the milk car. The cars are cooled with ice, and the milk is kept sweet until it is delivered at the city homes. To supply the milk and cream needed in one day in the city of New York requires 1,500,000 quarts of milk. Some of this comes from New Jersey, eastern Pennsylvania, Connecticut, and western Massachusetts, as well as from New York state.

In some of the dairy districts of Pennsylvania and New York, the milk is used in creameries and cheese factories for making butter and cheese. There are many such factories in the central and northern parts of New York, and the city of Utica has long been a well-known market for the cheese produced there.

The great forage crops are hay and corn. Hay is needed for the cattle and horses on the farms, and some hay is pressed into bales so that it can be conveniently shipped to market in town or city. Much of the corn is cut when fully grown but not fully ripened. The stalks, leaves, and ears are cut into short pieces and stored in the *silo* (Fig. 126), a tall building, usually round, which is a familiar sight in connection with the farmers' barns. The material stored in the silo keeps through the winter in a juicy state and is fed to cows to keep up the flow of milk.

The raising of poultry is also a very extensive and profitable industry in the Middle Atlantic States and in many other states. The eggs and the fowls find a ready market in the cities and larger towns.

Fig. 126. Cattle barns, with silo at right

Review.—1. What is soil? 2. What are some of the main kinds of soil? 3. What is the origin of soils? 4. How do soils in the region once covered by ice differ from other soils?

5. What is the advantage of keeping soils well cultivated? 6. What is the rotation of crops? 7. Why is it important?

8. What use should commonly be made of lands with steep slopes? 9. Why are slopes in some parts of old countries terraced?

10. What are the prevailing winds in these states? 11. How does the sea affect the climate of this region? 12. How does the rainfall vary from the seacoast to the Great Lakes? 13. How do the lakes affect the products of New York?

14. About how much wheat is brought each year from the West for each one of the population of New York? 15. Where was the former center of wheat production in this country? 16. At what city were the largest flour mills?

17. What are the chief localities for truck farming? 18. What important fruit crops are raised in New York? 19. How does New York compare in fruit raising with California? 20. Name some of the special crops in the Middle Atlantic States.

21. Give an account of the milk supply of the city of New York. 22. What is a silo?

VALUABLE MINERALS

111. Origin of Coal.—In ancient periods in the history of the earth, forests grew in great swamps and on their borders. The wood, leaves, and mosses gathered for a long time and were kept from decay by the water. This mass of plant substances was turned into coal, in much the same way as vegetation in swamps may now change into the brown substance called peat, which is used for fuel in Ireland and in a number of other countries. We know that coal is made from plants, because it consists mainly of a substance, called carbon, which is abundant in plants, and because in connection with coal beds we find leaves, tree trunks, roots, and fruits in a petrified, or fossil, condition. We also find peat, woody coal or lignite, bituminous coal, and hard coal or anthracite, a series that shows all degrees of change from wood to the hardest coal. Water came in over these great swamps and covered them with layers of mud. Later the swamp deposits were changed into coal and the mud layers were turned into rock. In Pennsylvania we find coal beds 5, 10, or more feet thick, lying between beds of rock.

112. Coal Regions.—In eastern Pennsylvania, between the Delaware and Susquehanna rivers, is found nearly all the anthracite in this country. It is hard, shiny, and burns with little flame. In western Pennsylvania is much soft, or bituminous, coal. It is softer than anthracite, lights more easily, burns with more gas and flame, and gives less heat, lasting a shorter time.

The anthracite is all in the region of the Appalachian Mountains (Sec. 48). The pressure that folded the rocks also pushed up the beds of coal, and squeezed them so that they gave off some of their gases and became hard; that is, they were changed into anthracite. The soft coal is in the Appalachian Plateau (Sec. 49). These beds of coal are horizontal, like the rocks; not so much gas was driven off, and the coal did not become so hard.

A number of cities have grown up about the hard coal or anthracite mines. The largest of these is Scranton. Among the others are Wilkes-Barre, Hazleton, and Pottsville. Many of the mines are several hundred feet underground. The coal is dug out by the miners, hoisted to the surface, and run through a breaker, where the pieces of rock are picked out. The coal is then screened into the common sizes, such as pea, chestnut, and egg, and sent to market.

When anthracite was discovered, about a hundred and twenty-five years ago, the people thought it worthless, for they did not know how to make it burn. Only a little soft coal was used. To-day, coal produces the steam that turns the wheels of far more cars and mills than any other power.

There is an enormous demand for anthracite, especially for heating and cooking, and the railroads that run into the anthracite region make a vast business of hauling the coal.

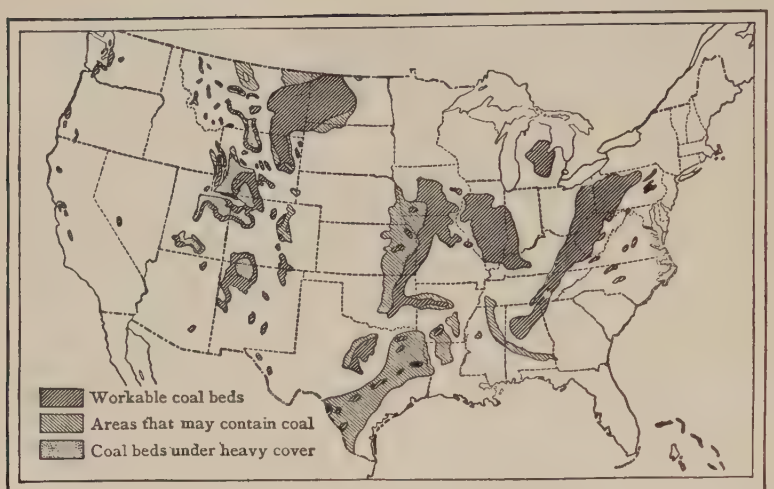


Fig. 127. Coal fields of the United States

The cities of New York, Philadelphia, and Baltimore are the most important markets, and are all reached by short hauls over the railroads. Great quantities of coal are taken in barges from the railroad terminals, to many Atlantic seaports (Sec. 87).

Several railroads distribute the coal through New York state and New England. Large amounts go to the ports of the Great Lakes and the cities of Canada. In Canada the anthracite is carried as far west as Winnipeg, and in the United States beyond the Mississippi River. Thus we may follow the coal from the mine, by ship and train, to the houses and factories of two countries.

The bituminous coal of western Pennsylvania is a part of great beds which reach as far south as Alabama (Fig. 127). Vast quantities of this coal are used in the iron industry of the Pittsburgh region.

113. Petroleum.— Until the middle of the last century, whale oil and tallow candles were still the usual means of lighting homes and places of business. Then petroleum, or rock oil, was found in large quantities by drilling wells into the sandstone rocks of western Pennsylvania. Before that time a little of the oil was sometimes found floating on the surface of springs or streams after it had come out of the earth with spring water. It was collected for use as a medicine, first by Indians and later by white men.

The oil lies among the grains of sand which make up the porous rock. In some places it was many hundred feet below the surface but was under such great pressure of gas that when the drill reached it, the oil spouted above the surface. Such wells were known as "gushers." All the Pennsylvania wells now have to be pumped (Fig. 128).

The crude petroleum is sent to the great refineries in Philadelphia, Pennsylvania, or Bayonne, New Jersey, or other distant cities, through pipe lines, equipped at intervals with pumping stations. At the refineries the crude oil is separated into kerosene, gasoline, vaseline, paraffin, and many other substances.

Kerosene and other oils are carried in tank cars and ships to all parts of this country and to foreign lands, and distributed from local stations of the oil companies and by retail dealers. To get the raw material, carry it to a factory, where it is made into the desired products, and then take them to market,—these are the steps in almost every great industry.

Fig. 128. In the Pennsylvania oil region

The oil wells of Pennsylvania are not

now so productive. Much oil is now found in West Virginia, Kansas, Oklahoma, Arkansas, Louisiana, Texas, and California (Fig. 129). More petroleum is produced in the United States than in all other countries of the world.

Fig. 129. Principal petroleum and natural gas fields of the United States

114. Natural Gas.—Natural gas is found in the rocks, in some places with petroleum, but in other places without it. The gas is obtained by drilling and is piped to houses and factories, to be used for light and heat, and to produce power. In western Pennsylvania and western New York gas is abundant and is much used in Pittsburgh, Buffalo, and other cities.

115. Iron.—Iron is mined in the Adirondacks in New York, in the New Jersey highlands, and in various parts of Pennsylvania. But most of the ore used in the iron furnaces of Pittsburgh, Buffalo, Lackawanna, and other places in these states is brought from the Lake Superior region.

116. Salt.—Much salt is found in New York state. The Indians knew of springs of salt water where the city of Syracuse now stands. The early settlers also made salt there by boiling down the salt water in kettles. Later it was evaporated in open vats or pans, which covered many acres near Syracuse, and by boiling. In 1880, a boring made in western New York, which was sunk for oil, went through beds of rock salt. This was the beginning of a great salt industry in the Genesee Valley and in the area about the heads of Cayuga and Seneca lakes.

Fig. 130. Bagging cement in a Pennsylvania mill

Wells are bored several hundred or even two thousand feet deep, and water is pumped in to dissolve the salt. The brine is then pumped out, and the water evaporated by boiling.

117. Clays, Cement, and Building Stone.—Brick clays and clays for making drain and building tile are found in many places. The largest beds are along the Hudson River. The bricks are molded, baked, loaded into scows, and towed down the river to be used in the great city at its mouth or to be sent to other markets.

Natural, or *hydraulic*, cement rock occurs in New York, but Portland cement is now more extensively used. It is made of clay and limestone, chalk, or marl, mixed properly, heated, and ground to powder. Large cement factories are found in all the states of this group (Fig. 130). The industry is most important in the southeastern lowland of Pennsylvania. The cement industry has had a very rapid growth, because cement is used extensively in the foundations and walls of

buildings, and in sidewalks, bridges, dams, and many other structures.

Much building stone is quarried in the Middle Atlantic States. New York has marble and sandstone, and Pennsylvania has large slate quarries.

Fig. 131. Part of the Croton Reservoir

118. Water Resources.—The Middle Atlantic States have several important rivers (Sec. 103). In New York and those parts of the other states that were covered by the glacier, there are many lakes (Sec. 79). Because of the abundant rainfall, there is ordinarily plenty of water in the ground. Formerly most water for use in homes was pumped from wells or taken from streams. But in many places the waste from houses and factories pollutes the wells and rivers and makes their waters dangerous to health. Many cities now draw water from lakes, or build reservoirs to gather the waters of clean forests and mountain slopes. The city of New York gets its water from reservoirs in the basin of the Croton River (Fig. 131) and in the Catskill region. The borough of Brooklyn receives water from ponds and reservoirs on Long Island.

Much water power is available in these states. The greatest is that of Niagara River at the Falls. By this power electricity is generated, which is transmitted to Buffalo and to other cities. The Upper Hudson, the Black River, and other streams of the Adirondacks afford a vast amount of water power, for many industries, especially for pulp and paper mills (Fig. 132).

Review.—1. What is the origin of coal? 2. How do we know this? 3. What is anthracite? 4. Where is it found? 5. What cities have grown up on account of the mining of this coal? 6. What processes are necessary before the coal is ready for market? 7. What are the principal cities and regions to which it is sent? 8. In what ways is it carried? 9. What kind of coal is found in western Pennsylvania?

10. Where is petroleum found in this group of states? 11. How do the rocks hold the oil? 12. What is a gusher? 13. How is the crude oil taken to the refineries, and what is done with it? 14. What substances have you seen that are made from petroleum? 15. Describe, if you can, the appearance of a tank car for oil. 16. What states now produce much oil? 17. Where is natural gas found in the Middle Atlantic States?

18. Give an account of the salt industry in New York. 19. In what part of New York are many bricks made? 20. How are they transported, and where? 21. Where are the very large Portland cement plants located?

Fig. 132. One of the great paper mills on the Black River, New York

PRINCIPAL CITIES AND INDUSTRIES

119. Great Cities and Routes of Trade. —We shall best understand this part of our country if we study two important trade routes and the cities which they connect.

The route from New York to Buffalo will be studied first. Both of these cities are in New York state. One is on the sea and is our main gateway to Europe. The other is on Lake Erie and is a gateway to the West. They are connected by the Hudson River and the Erie Barge Canal and by the New York Central and other railroads. New York is the eastern terminus, and Buffalo a stopping place, on several of the routes of travel and trade that lead across the continent.

The second route is from Philadelphia to Pittsburgh. Philadelphia is a great seaport. Pittsburgh is on the upper Ohio River, and is a gateway to the West, for the Ohio River leads to the plains of the Mississippi, as the Great Lakes lead westward from Buffalo. The route between Philadelphia and Pittsburgh is now the main line of the Pennsylvania Railroad, one of the largest railroad systems of the world.

120. The City of New York. —At the eastern end of the first trade route mentioned above, is New York, the largest city in America. At the time of the American Revolution New York was smaller than Philadelphia, but it has grown more rapidly, for reasons that we shall see.

The first reason is, that New York has one of the best harbors in the New World. The Hudson River is wide and is deep enough for the largest ocean ships; great piers for their use have been built on the New Jersey side as well as on the New York side. There is wharfage also on New York Bay and on both sides of the East River, in Manhattan and Brooklyn. The East River is not a river at all, but a strait joining New York Bay and Long Island Sound. On the map (Fig. 133), find Sandy Hook, the Lower Bay, the Narrows, New York Bay, Ellis Island, and the tidal inlets that extend into New Jersey. The port of New York has about 450 miles of water front, of which 125 miles are available for ocean steamships (Fig. 134).

A second reason for New York's greatness is that it is joined by several good routes to the interior of the country. The most important of these routes is along the Hudson to Albany, and west through the Mohawk Valley and along the Lake Plains to Buffalo and Chicago. The Hudson enters the ocean through a deep

Fig. 133. The city of New York and vicinity

Fig. 134. Great ocean liner entering its dock, New York

channel, and the Mohawk Valley is cut down nearly to sea level, across the Appalachians. Farther south the lowest passes for railroads or canals are from 1500 to 2500 feet above the sea. Along the shore line and coastal plain railroads find good grades from New York to Boston and from New York to Philadelphia and many other cities all the way to Florida.

121. Greater New York.—Until 1898 only the city on Manhattan Island and a mainland district northeast of the island were known as New York. In that year "Greater New York," or the city of New York as it is now, was formed, consisting of the five boroughs, Manhattan, the Bronx, Brooklyn, Queens, and Richmond (Fig. 133).

Fig. 135. Lower New York at night

The population of New York in 1920 was over 5,600,000. There are cities containing in all more than a million people, across the Hudson, in New Jersey, which cannot be put under the same city government because they are in another state. If these, and the people of Yonkers, Mount Vernon, New Rochelle, and other adjoining places in southern New York are added to the population of the city of New York, we find that the real metropolis contains more than seven million people.

Manhattan, or the old New York, is the principal business section of the city. The great wholesale trade is in the lower part of the borough, the retail trade in the middle portion, and the better residence sections lie to the north. Broadway is one of the longest and most magnificent business streets in the world (Fig. 135).

In addition to the surface cars and trains in all the boroughs, there are several lines of elevated railroad and subways which run the length of Manhattan and extend far into the Bronx and Brooklyn. Several bridges span the East River between Manhattan and Brooklyn, and tunnels run under the

Hudson and East rivers. By one of these tunnels the Pennsylvania Railroad line passes under the Hudson River, and enters, in the heart of the city, a large new railroad station. Of the tunnels passing under the East River, one connects the Long Island Railroad with the Pennsylvania system. A great station has been constructed for the New York Central lines also (Fig. 136). The various means of travel already mentioned, and numerous ferries, are used every business day by several hundred thousand people who work in Manhattan but live in one of the other boroughs or in some suburb of New York.

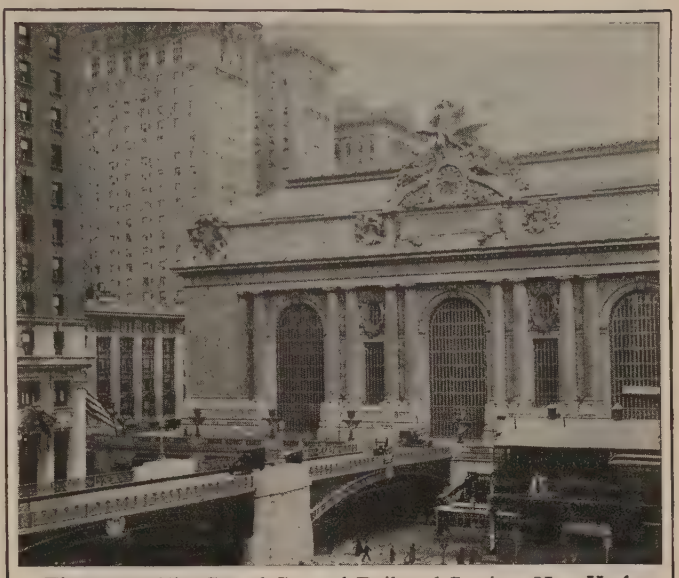


Fig. 136. The Grand Central Railroad Station, New York

New York's coasting trade reaches all the ports of eastern Canada, eastern United States, the West Indies, and the Gulf of Mexico. Steamship lines of Great Britain, the United States, France, Holland, Norway, Sweden, Italy, Spain, and Greece ply regularly between New York and European ports. The fastest steamships of the world run between New York and the ports of Great Britain and France (Fig. 134). Nearly half of the exports and imports of the United States pass through the port of New York.

Of the immigrants coming to this country to live, nearly all come by way of New York. A large number of these people stay and find work or business in the city, and hence all races and languages are found there.

Fig. 137. Winding ribbons in a silk mill, Paterson, N. J.

New York is by far the greatest manufacturing city in America. The largest item is the making of clothing. The printing of books and papers is second. Sugar-refining is carried on in Brooklyn and is a very great industry. Petroleum is brought in pipe lines (Sec. 113) and refined in New Jersey, across the Hudson from New York. Many of the manufactures of Jersey City, Newark, and other New Jersey cities have reached their present development because they are so near the great industrial and trade center of New York. An example is found in the silk mills of Paterson, the largest silk center in this country (Fig. 137). Not only silks, but textiles of every kind, are made in and near New York. But the city is too great to be known by any one industry, as Fall River is known for cotton, Lynn for shoes, or Pittsburgh for iron.

As more business is done in New York than in any other American city, it has become the principal financial center of the country. Many of the largest banks and other corporations have their offices on or near Wall Street.

The oldest and largest and best known of the higher institutions of learning in the city of New York is Columbia University.

New York University, Fordham University, and several colleges also are located there.

Life in New York is like that in most large cities. The poorer people live in the tenements, where a whole family may have only a few rooms or sometimes but one or two. There are tenement buildings in which hundreds of people live in this crowded way under one roof.

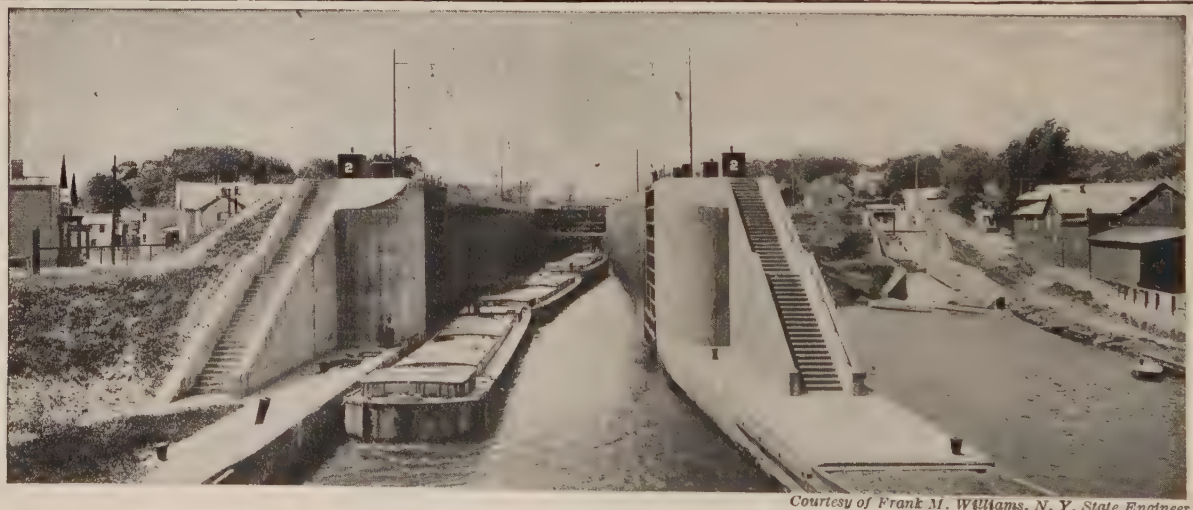
People of moderate means usually live in apartment houses, which are houses of a better class than the tenements, and in each of which a number of families have their separate apartments. Some apartments are very large and provide elegant and expensive homes for people of wealth. Thousands of people go many miles each day to reach a modest home in a suburb of the city. Most of the houses in the crowded parts of large cities are built close together in solid blocks. A few of the very rich live in houses which, in the older countries of Europe, would be called palaces.

To feed, clothe, and house the people of the city, to build and maintain stores, offices, factories, churches, schools, hotels, streets, and sewers, requires the labor of millions of men. Many of them live in or near the city, and many live far away.

122. From New York to Buffalo.—The easiest route from New York to Buffalo leads up the Hudson to Albany, from Albany to Schenectady, through the Mohawk Valley to Utica, and thence by way of Syracuse and Rochester. This route was followed by the canoes of the savages and by their forest trails. The white men built roads through the wilderness along the same route. In 1825 the Erie Canal was completed, and boats were drawn by horses or mules between Lake Erie and the Hudson River. On the Hudson the canal boats were lashed together and towed to New York by steamboats.

Soon afterwards a railroad was built from Albany to Schenectady. As the years went on other sections of railroad were built by different companies. These short roads were finally united to form the New York Central and Hudson River Railroad, and freight and passengers could then be carried without change of cars from New York to Buffalo, and by connecting roads to points farther west.

The Erie Canal and branch canals have recently been improved, and are known as the "barge canal" because they have been made large enough for barges holding each a thousand tons of freight (Fig. 138). The new routes are shown in Figure 115.



Courtesy of Frank M. Williams, N. Y. State Engineer

Fig. 138. A large lock on the barge canal, replacing the smaller locks on the right. Eastern end of the Erie Canal

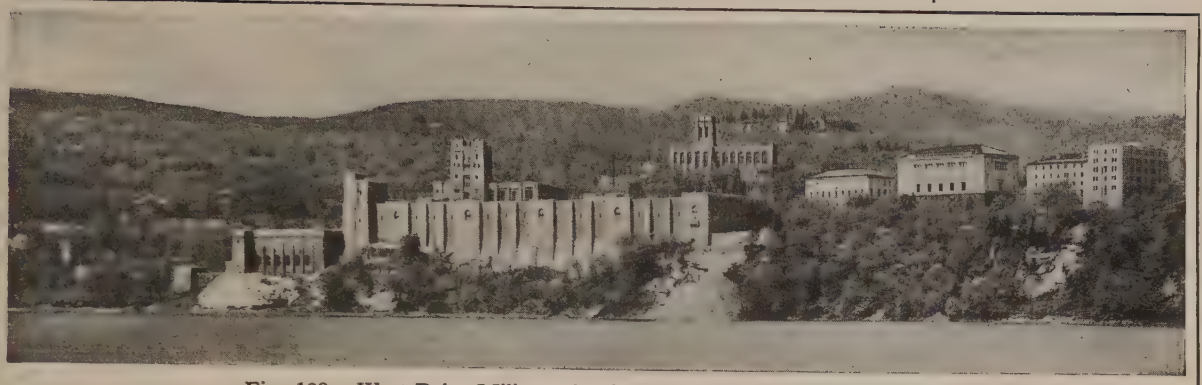


Fig. 139. West Point Military Academy, seen from the Hudson River

Along this main route from New York to Buffalo are most of the larger cities of the state, and it is bordered by rich farms. Within a few miles of it live three fourths of all the people of the state.

Going up the Hudson River from New York, we pass the city of Yonkers, with its sugar refineries and extensive carpet and elevator factories; and then the cities of Newburgh, Poughkeepsie, and Kingston, each a manufacturing and trading center. The cliffs of the Palisades extend on the west side to the Highlands. In the Highlands is West Point Military Academy, a school maintained by the United States government for training officers for the army (Fig. 139). North of the Highlands, on the west side of the Hudson, the Catskills are seen.

Near the point where the Mohawk enters the Hudson there are several cities. Albany is the largest and is the state capital. Troy is second and is the chief center in the United States for the manufacture of collars and cuffs and laundry machinery. Cohoes is on the falls of the Mohawk and is one of the largest centers for cotton knit goods.

Northward from these cities is an open valley followed by a canal to Lake Champlain and by a railroad along the shore of Lake Champlain to the St. Lawrence at Montreal. Eastward two trunk railroads lead to Boston. One of these goes by the Hoosac tunnel (Sec. 98) and the other by Springfield and Worcester (Sec. 99). Albany and Troy are near the head of navigation on the Hudson, and have grown up where great routes running north and south and east and west cross each other. We shall find other large cities that have grown up at such "crossroads" of trade.

In the Mohawk Valley, about fifteen miles northwest of Albany, is the flourishing city of Schenectady. Here are located large locomotive works and also one of the world's greatest plants for the manufacture of electrical machinery and supplies (Fig. 140). Farther west is Amsterdam, with knitting mills and other industries. A few miles to the northwest are the two small cities of Gloversville and Johnstown, which make almost half of the gloves made in the United States.

Fig. 140. Electric works at Schenectady

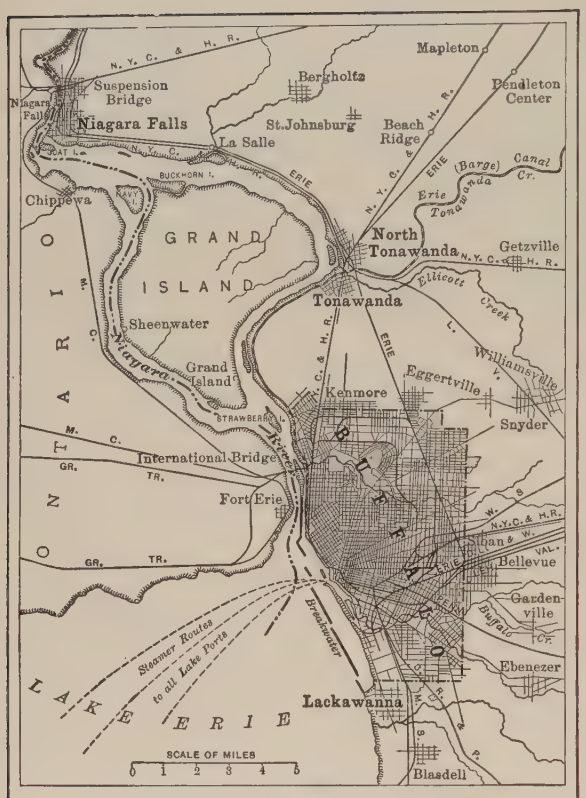


Fig. 141. Buffalo and vicinity

Utica is on the Mohawk, where railroads from the Adirondacks and the St. Lawrence on the north, and from towns of the plateau on the south, meet the New York Central Railroad. Utica is the center of a rich farming region and is an important cheese market. It has large cotton and woolen mills and manufactures of men's clothing.

Syracuse, like Utica, is an important railroad center. It had its beginning in the salt industry. When that industry moved farther west (Sec. 116), the city continued to grow because other industries were established there,—among them the making of automobiles, typewriters, and agricultural implements. The city is the seat of Syracuse University. At Solvay, a suburb, is an establishment that makes soda ash and other products from limestone and the brine obtained from the salt wells near the city. By a branch of the barge canal, Syracuse is connected with the port of Oswego on Lake Ontario.

Auburn is a center for the making of agricultural implements.

Rochester is at the falls of the Genesee River, a few miles from Lake Ontario. In Rochester, as in Syracuse, the first important industry is no longer the chief business (Sec. 108), though much flour is still made there. Rochester is a great manufacturing city, producing photographic and optical supplies and apparatus, clothing, shoes, and many other things in its hundreds of factories. It is also a center for the growing of garden seeds and nursery stock. Many steam and electric railroads enter the city.

123. Buffalo and Vicinity.—Buffalo was founded little more than one hundred years ago, but its advantageous location has helped to make it the second city of New York state (Fig. 141). It is at the east end of Lake Erie, and on the edge of the Lake Plains (Sec. 102), which extend eastward to the Mohawk Valley. Several railroads from New York to the West were built to this point. From Buffalo they continue westward to Chicago, either south of Lake Erie, or, by crossing the Niagara River, north of the lake through a part of Canada. Because the Niagara Falls are a barrier for ships, much of the freight that comes down the lakes in steamships is transferred to cars or to boats on the Erie Barge Canal, in order to be sent farther east.

Fig. 142. Grain elevators, Buffalo Harbor

Much grain comes to Buffalo from the West. Here the first elevator was built in 1843. An elevator (Fig. 142) is a large, and usually a high, building, with bins, carriers, and chutes for unloading, storing, and re-

loading grain. Buffalo has many such elevators. Iron ore is brought here from the Lake Superior region, and Lackawanna, south of Buffalo, has one of the largest steel plants in the world. Lumber also comes down the lakes and is marketed at and near Buffalo. Live stock from the West, and fish from the lakes, are important commodities in the trade of the city.

More than twenty railroads enter Buffalo. Those from the south and southeast bring enormous quantities of coal, which meet the local needs and are shipped to cities on the lakes.

The industries of Buffalo include flour milling, meat packing, and foundry and machine shops.

Niagara Falls is an important manufacturing city, because of its immense water power. Electrical energy is developed at very low cost, and is used in the manufacture of the light metal aluminum and in other industries. Much electrical power also is transmitted to Buffalo and other places.

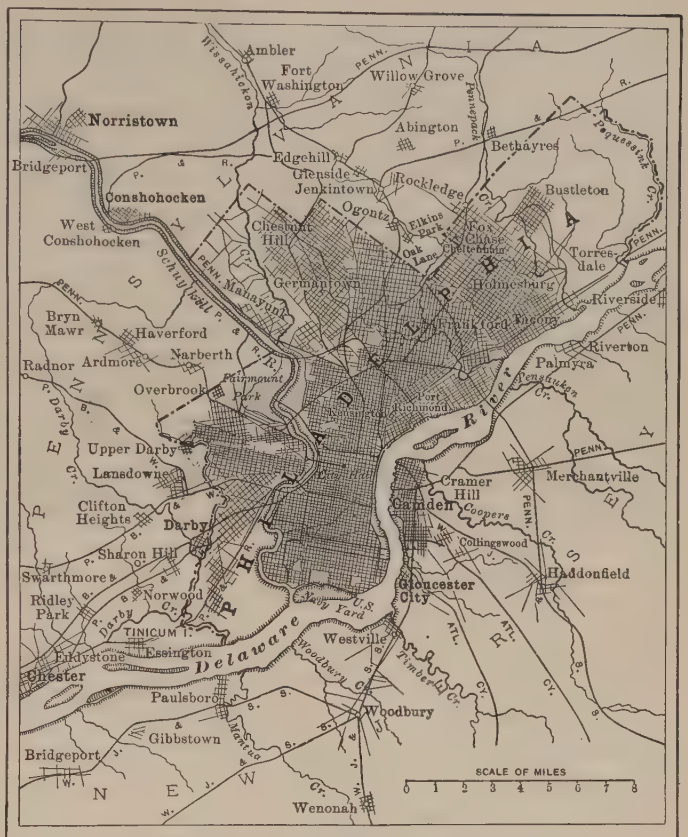


Fig. 143. Philadelphia and vicinity

124. Other Cities and Industries of New York.—West and north of the Adirondacks, toward Lake Ontario and the St. Lawrence River, is a belt of agricultural lowlands, of which Watertown and Ogdensburg are the chief centers. At and near Watertown are pulp and paper mills, originally located there because of water power and of spruce forests close at hand (Fig. 132). Much of the pulp wood now used in these mills, however, is brought in from Canada. The same industry exists at Glens Falls and other places on the upper Hudson. Much of the output is sold to the newspaper, magazine, and book publishers of New York.

Several cities in southern New York are reached by the Erie, the Delaware Lackawanna and Western, the Lehigh Valley, or other railroads. Among these are Binghamton on the Susquehanna River, Elmira on the Chemung River, and Jamestown at the outlet of Chautauqua Lake. These are important manufacturing cities, and trading centers for the regions around them, and they are brought into touch with the large city markets by the railroads that pass through them. Ithaca, at the head of Cayuga Lake, is the seat of Cornell University, one of the great universities of the country.

125. Philadelphia.—In 1681 William Penn, a sturdy English Quaker, received from the king of England, in payment of a debt, a grant of the land which now forms the state of Pennsylvania. The name was then suitable, for it means Penn's Woods. Penn founded Philadelphia, which to this day is often called the Quaker City. It is on the tidal part of the Delaware River, as far up the stream as the large ocean ships of the present time can go (Fig. 143).

Fig. 144. Shipyards at Philadelphia. The traveling crane carries parts and materials to their places. A bent beam is being lowered to a ship

Philadelphia, with more than 1,800,000 people, is larger than any other American city except New York and Chicago. In it are the Independence Hall and the Liberty Bell, and here the Declaration of Independence was written and the Continental Congress held its sessions. Here, after the war of the Revolution was over, the Constitution of the United States was framed. Philadelphia was for a short time the capital of our country.

Like all large cities, Philadelphia has many industries. Among the greater are manufactures of wool, cotton, leather, and iron, and the refining of sugar and petroleum. The crude oil is brought by pipe lines from the oil region (Sec. 113). The woolen manufactures are largely carpets and rugs, of which Philadelphia makes more than any other city; it also makes much clothing. Iron work includes bridges, locomotives and cars, and ships. In the shipyards of this city are built many vessels for commerce and for war (Fig. 144).

The location of Philadelphia gives it many commercial advantages. As a seaport it takes part in the coastwise trade with cities of the Atlantic and Gulf coasts. Several steamship lines also run vessels between Philadelphia and foreign ports. The city is connected by rail with all the large eastern cities. To the west the city connects by trunk lines of railroad with Pittsburgh, and through Pittsburgh with all the large cities of the West and Southwest.

Westward from Philadelphia is a rich agricultural region extending to the Appalachians (p. 74). Here are suburbs and industrial cities, all aiding the growth of Philadelphia, which is favored also by nearness to the anthracite fields.

Philadelphia is the seat of the University of Pennsylvania. Pennsylvania State College, another large educational institution, is located in the central part of the state.

126. From Philadelphia to Pittsburgh.—In the early days a *turnpike* road was built as far west as the Susquehanna River. About 1758, in the time of the French and Indian War, the road was extended to the site of Pittsburgh for the use of English soldiers. In the early days of railroad building, a line, now the main line of the Pennsylvania Railroad, was built between these two cities. A network of railroads now extends into all parts of the state, and the traffic in many products carried by them is very large. The coal traffic of Pennsylvania is enormous. Much coal is carried to Philadelphia for the coasting trade (Sec. 112), to Baltimore, to New York, to the Great Lake ports, and to western cities.

From Philadelphia to Lancaster and Harrisburg, the railroad runs through a rich farming region. Harrisburg is a few miles south of the water gap by which the Susquehanna River cuts through Blue Mountain. It is the capital of the state and has large iron furnaces.

Fig. 145. Railroad bridge across the Susquehanna River, above Harrisburg

Above Harrisburg the railroad crosses the Susquehanna River (Fig. 145) and runs in narrow valleys among the Appalachians to Altoona, which lies between the mountain belt and the great wall, or *escarpment*, which rises to the Appalachian Plateau. At Altoona there are enormous railroad shops, in which thousands of men are employed.

The railroad climbs to the plateau by a great loop, and soon passes through Johnstown, which is close to beds of coal and has very large steel works. The road then continues through a mining region to Pittsburgh, the second largest city of the state. In connection with neighboring cities and towns Pittsburgh is the most important center for iron working to be found in any part of the world.

127. Pittsburgh and the Iron Industry (Sec. 5; Fig. 146).—The point of land lying between the Monongahela and Allegheny rivers, where their waters mingle to form the Ohio River, was for a short time in the possession of France. When it was taken by the English, in 1758, the fortification was named Fort Pitt, and the city that grew here was called Pittsburgh, in honor of the statesman who directed British affairs at the time of the French and Indian War.

Following the Revolution, many pioneers made their way over the new roads to Pittsburgh, fitted out rude boats for themselves and their goods, and floated down the river to some point where they wished to take up land and make a home.

Pittsburgh is not only on an important line of travel, but it is close to beds of bituminous coal. This is also a region of abundant natural gas (Sec. 114), and the city owes much of its importance to its cheap and abundant fuel and excellent facilities for transportation.

A part of the material used in its mills, however, comes from other states. Vast deposits of iron ore are found in Michigan, Wisconsin, and Minnesota, not far from Lake Superior. This ore is mined, taken to Duluth, Two Harbors, Ashland, Marquette, or other of the lake ports, and brought down the lakes in ore boats to Cleveland or other ports on Lake Erie (Fig. 222). Much of the ore is carried thence by rail to Pittsburgh, near the coal

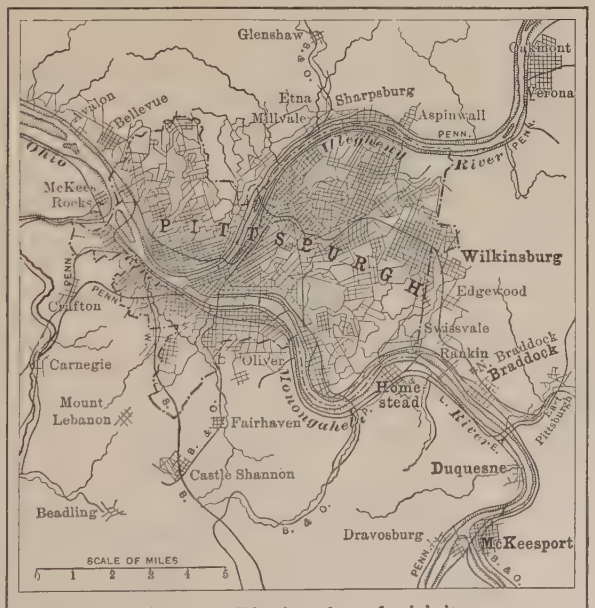


Fig. 146. Pittsburgh and vicinity

and limestone needed for separating the iron from the ore.

Iron ore is a mixture of iron with other matter. To separate the iron, the ore must be melted. The coal used for fuel is first turned into coke; that is, it is heated in large ovens until some of its gases are driven off. Then coke, iron ore, and broken limestone are put into the blast furnace. The furnace has a tall stack or cylinder supplied with a blast, or forced draft, to increase the heat. The limestone is put in as a flux; that is, to make the impurities separate from the iron and form slag.

At intervals the iron is drawn off and run into molds in sand, making pig iron. Or, the melted iron is run into a converter, where it is further purified and certain substances are added to it, so that it becomes steel.

Pig iron is brittle, and so are the many objects made from it, such as stoves. Steel is hard and elastic, and suitable for tools, girders, rails, watch springs, and boiler plates. From the time that the ore is melted, the iron may not be allowed to cool until it comes out as a steel rail ready to spike down as part of a railroad track. Wrought iron, made by a different process, is a kind of iron that can be bent or hammered into any desired form.

Fig. 147. Interior of a Pittsburgh glass factory

The making of glass has become an important industry of Pittsburgh, because of the supplies of cheap fuel and of glass sand near at hand. Much of the American plate glass is manufactured here (Fig. 147).

In the neighborhood are McKeesport, Braddock, Homestead, and other cities that share the industries of Pittsburgh. About fifty miles northwest of Pittsburgh is New Castle, also a center for the manufacture of iron and steel. To the southeast is Connellsville, where there are many coke ovens.

In Pittsburgh are the Carnegie Institute of Technology and the University of Pittsburgh.

128. Other Cities and Industries of Pennsylvania.—Erie, on Lake Erie, has a good harbor. It manufactures iron and steel goods and is an important trade and shipping center.

Williamsport, on the west branch of the Susquehanna River, stands, like Altoona, in a valley between the mountain belt and the plateau. Its chief industries are the manufacture of silk, and of rubber boots and shoes.

In the eastern part of the state are: Scranton, the third city of Pennsylvania in population, with silk mills and other manufactures, and an immense traffic in anthracite; Wilkes-Barre, another anthracite mining center; Reading, a railway center with large steel works, rolling mills, railroad repair shops, and knitting mills; Allentown, with manufactures of silk and iron; Bethlehem, with a large steel plant; and Easton, with silk mills and other manufactures.

In the southeastern part of the state, Norristown, near Philadelphia, has knitting mills. Chester, on the Delaware, has a large shipbuilding industry and manufactures of cotton and woolen goods. York, like Lancaster, is surrounded by rich farms and has factories of many kinds.

129. Cities and Industries of New Jersey.—In spite of the fact that New Jersey is a small state, it has a large population (Fig. 80) and many important industries. The greater part of its people live near the Hudson River opposite New York, and near the Delaware River opposite Philadelphia. Many lines of railroad cross the state from the west on their way to New York, or to join the two cities.

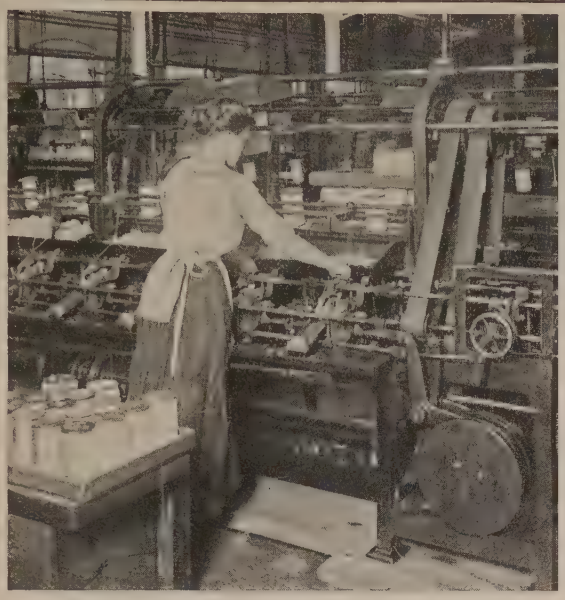


Fig. 148. Making thread, Newark. This machine winds the thread on small spools

In northern New Jersey the cities nearest New York are Hoboken, Jersey City, and Bayonne. They lie along the southern extension of the Palisades ridge on the west bank of the Hudson. Here are the terminals of the railroads from the interior, except the Pennsylvania and the New York Central (Sec. 121). Several well known lines of ocean steamships have their docks on the New Jersey side of the river, where it is convenient to transfer, from car to ship, goods that are being sent abroad. Bayonne has refineries for petroleum; the oil is received by pipe lines from the wells of Pennsylvania, Ohio, and other states (Sec. 113). Jersey City has large slaughterhouses, soap factories, and many other manufactures.

The largest of New Jersey cities is Newark, with manufactures of leather, electrical machinery, thread, jewelry, chemicals, paints, and machine shop products (Fig. 148). Paterson is the great silk center (Fig. 137). Passaic makes textiles. Perth Amboy, at the mouth of the Raritan River, has an excellent harbor, with dry docks and shipyards. Through this port and Elizabeth is shipped much coal from the mines of Pennsylvania. Both these cities smelt and refine copper, and Elizabeth manufactures sewing machines and wire.

All the New Jersey cities already named, with many other cities and towns, are places of residence for people who work in New York.

Camden is near Philadelphia. Here ships are built, and leather, pens, and talking machines are manufactured. The city is also a residential city for many who work in Philadelphia.

Trenton is at the head of navigation on the Delaware River. It has water power (Sec. 47), large pottery works and rubber factories, and is the state capital. New Jersey produces more pottery than any other state in the Union except Ohio. Trenton produces about half of the output of the state. China, white granite ware, and porcelain are made. Much of the raw material is obtained from other states.

Several towns in the southern part of the state manufacture glass. Atlantic City is a place of both summer and winter resort, being relatively cool in summer and mild in winter. The village of Princeton is the seat of Princeton University.

Review.—1. Give reasons for the growth of the city of New York. 2. Compare the Hudson and Mohawk Valley route with other routes across the Appalachian Mountains. 3. What boroughs form Greater New York? 4. Describe the various means of transportation in the city. 5. What share of the foreign trade of the United States passes through the city of New York? 6. Describe the kinds of homes in a great city.

7. Give an account of the Erie Canal. 8. What route leads from New York to Montreal?

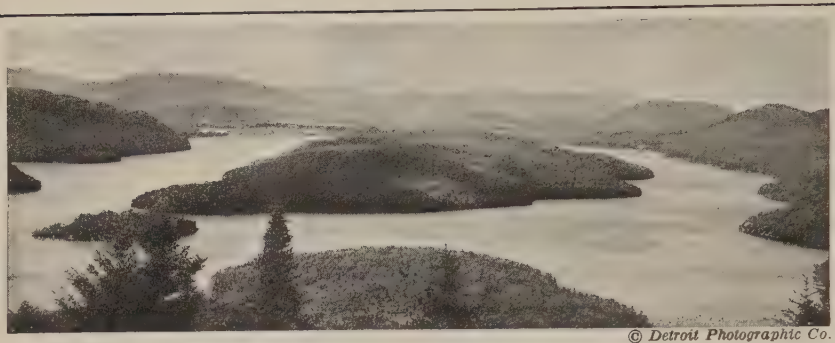


Fig. 149. Lake Placid, in the Adirondack Mountains

9. What reasons can you give for the growth of Buffalo? 10. What is a grain elevator? 11. What important products pass through Buffalo?

12. Give an account of the origin of Pennsylvania and Philadelphia. 13. What historical events have taken place in Philadelphia? 14. What ways of communication has it, by land and sea? 15. What are its principal industries?

16. What rivers unite at Pittsburgh? 17. Give facts about the history of Pittsburgh. 18. How is the iron ore of the Lake Superior district brought to Pittsburgh? 19. Where is the coal found which is necessary for melting the ore? 20. How is coke made? 21. Why is limestone used in the blast furnace? 22. What is pig iron? 23. How does steel differ from pig iron? 24. What is wrought iron? 25. What other mineral industry is important in Pittsburgh?

RESORTS

130. Places of Resort.—Since the Middle Atlantic States have over 22,000,000 people, there is much need of places for recreation. In addition to the places of resort along the New Jersey and Long Island shores, there are many resorts among the mountains, especially in the Adirondack region (Fig. 149), where the state of New York has large forest reservations. In like manner, the wooded heights of the Catskills, the lakes of central New York, the Great Lake shores, and the mountains and water gaps of Pennsylvania afford rest and change to the toilers of town and city. Saratoga Springs has the most remarkable group of mineral springs on the continent. These have been purchased by the state of New York and reserved for the use of the people. Most of these spring waters are believed to be helpful in curing certain diseases, and people come even from distant places to drink them.

Review by States.—New York (N.Y.). 1. Describe the surface of New York. 2. Give an account of the drainage. 3. Bound the state and locate its capital. 4. On what river is Watertown? 5. Why is this city a favorable point for manufacturing? 6. Where are the wood pulp and paper factories of the state located? 7. Where is a market found for much of the product? 8. Draw from memory a sketch map of the Hudson River system, and on it locate ten cities, including centers for the making of electrical supplies, collars and cuffs, carpets, gloves, and knit goods. 9. Give the location and industries of Utica, Syracuse, and Rochester. 10. What are the chief regions for grapes? 11. Give the location of Binghamton, Ithaca, and Elmira.

New Jersey (N.J.). 12. Where is Sandy Hook? 13. To what physical region of the country does southern New Jersey belong? 14. In what great cities do many people of this state do their work? 15. What is an important industry in Trenton? 16. What important cities are near New York? 17. What city has large manufactures of silk? 18. Where are great petroleum refineries found? 19. What are the leading industries of Newark? 20. What is the density of population of New Jersey (Fig. 80)? How does this compare with that of your own state?

Pennsylvania (Pa. or Penn.). 21. Bound the state and locate its first city, its second city, and its capital. 22. What is a large industry in Williamsport? 23. What is the principal railroad system of the state? 24. What is the principal business in Altoona? In Johnstown? 25. What cities near Pittsburgh share its industries? 26. Where is the bituminous coal found? The anthracite? The natural gas? 27. Where is a rich farming district in the state? 28. Make a sketch map of the state, locating the principal rivers and cities.

THE SOUTH ATLANTIC STATES

131. Early Settlements. — The discovery of the New World was followed at once by active exploration, but many years passed before permanent settlements were established in what is now the United States. Although the Spanish government claimed title to all this region, it was never able to enforce the whole claim. As a result the northern part of the land now occupied by the South Atlantic States was explored and settled by the people of England.

The southern part of our country was, however, actually explored by the Spanish. To a large region in the southeast they gave the name Florida, which means "land of flowers" (Fig. 150). It was not until long afterward, when this region was divided into several states, that the use of the name was limited to the present state of Florida.

Fig. 150. Tropical vegetation in Florida

All of the early Spanish expeditions were sent out to search for gold, and the Spaniards cared little about settling in any part of the country where gold or silver could not be found. For that reason they established few permanent settlements, even in the southern part of the country.

The English also laid claim to much of the New World, and as they were able to enforce their claim they gave at first the name Virginia to the territory from which the original thirteen colonies were formed. The different parts of the region later received other names, but the name Virginia was kept by one of the states of the South Atlantic group. At first the English settlers in the northern states of the group also wasted their time in a vain search for gold. Finally, however, they became more sensible, established homes, and began to cultivate the soil. Agriculture soon became profitable and it has steadily increased in importance down to the present time. Other industries have been established and many crops not at first cultivated have been introduced. One of the most interesting of the recent industrial developments of our country has been the rapid increase of manufacturing in the South.

In no part of the country are the people more truly American than they are in the southern states —South Atlantic and South Central. Many of them are the descendants of the proud and cultured pioneers who settled here two or three hundred years ago, and some of them still own and cultivate the land which their ancestors first subdued and brought under cultivation.

Most of the immigrants who have in recent years come to our country have settled near the northern ports where they entered, or have moved farther west. Very few of them have gone into the southern states.

The negroes in the southern states form a large part of the population. Most of them are good workers who recognize the southern white man as their friend, and who find opportunity for profitable employment in the old as well as in some of the new industries of the South.

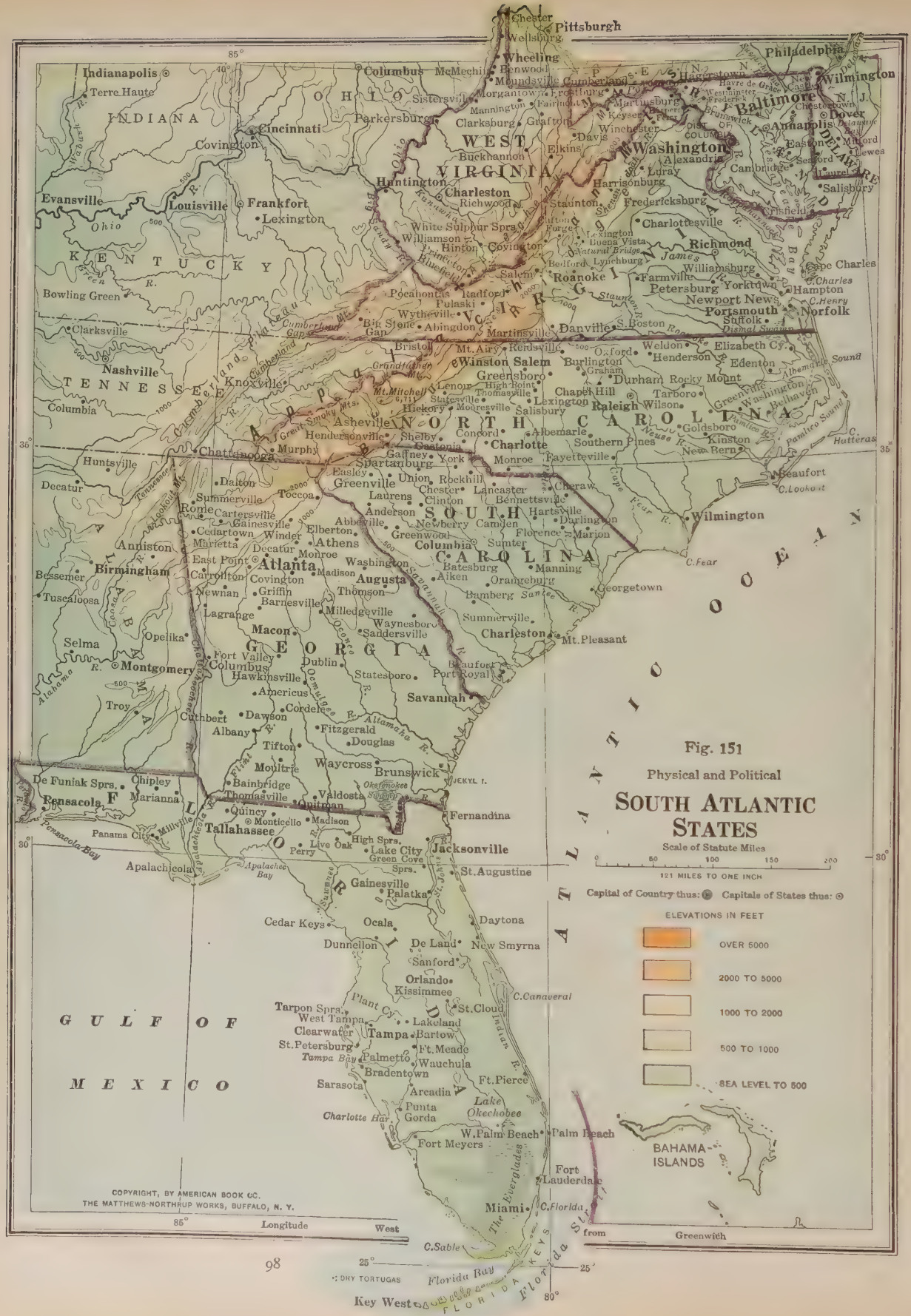


Fig. 151
Physical and Political
SOUTH ATLANTIC STATES
Scale of Statute Miles
0 50 100 150 200
121 MILES TO ONE INCH
Capital of Country thus: ⊛ Capitals of States thus: ⊙
ELEVATIONS IN FEET
OVER 5000
2000 TO 5000
1000 TO 2000
500 TO 1000
SEA LEVEL TO 500
BAHAMA ISLANDS
ATLANTIC OCEAN
GULF OF MEXICO
Longitude West from Greenwich
COPYRIGHT, BY AMERICAN BOOK CO.
THE MATTHEWS-NORTHRUP WORKS, BUFFALO, N. Y.

THE SOUTH ATLANTIC STATES

	Area, Sq. Mi.	Population, 1920	Capital
Delaware	2,370	223,003	Dover
Maryland	12,327	1,449,661	Annapolis
Dist. of Columbia	70	437,571	——
Virginia	42,627	2,309,187	Richmond
West Virginia	24,170	1,463,701	Charleston
North Carolina	52,426	2,559,123	Raleigh
South Carolina	30,989	1,683,724	Columbia
Georgia	59,265	2,895,832	Atlanta
Florida	58,666	968,470	Tallahassee

Map Study.—1. Which of the South Atlantic States are partly in the Appalachian Mountains? 2. What rivers discharge their waters into the Chesapeake Bay? 3. What river has its source in Virginia and its mouth in Albemarle Sound? 4. Trace the course of the Kanawha River. What name has its upper part? 5. Which is the longest river in North Carolina? 6. What states in this group are separated by a river?

7. Which state of this group has many lakes? 8. Locate the Dismal Swamp; the Everglades. 9. Where are the Florida Keys? 10. Which state of this group has no seacoast? 11. Has this state any communication by water? 12. Which state has the longest coast line?

13. Name and locate the capital of Georgia; of Virginia. 14. Name and locate two seaports of the same name, one in Delaware and the other in North Carolina. 15. Name the chief seaport of Georgia; of South Carolina; of Virginia. 16. Name and locate the southernmost city of this group.

PHYSICAL FEATURES

132. Surface and Drainage.—The South Atlantic group includes the seven states of Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, and Florida fronting on the Atlantic, and the inland state of West Virginia. As a study of the map (Fig. 151) will show, almost the entire group of states is included in the Atlantic Lowland (Sec. 47) and the Appalachian Mountains (Sec. 48). West Virginia is the only state in the group that includes any part of the Appalachian Plateau (Sec. 49).

The Atlantic coastal plain (Figs. 61, 152) includes nearly all of Delaware, more than half of Maryland, the eastern parts of Virginia and the Carolinas, and large sections of Georgia and Florida. We have already learned why this long belt of lowland is called the Tidewater country (Sec. 47). Not only are the lower parts of the rivers tidal, but many of them flow into broad bays due to the sinking of the coast. Of such bays, the Chesapeake is the greatest. The Potomac, Rappahannock, and James rivers flow into it, and its harbors and approaches are deep enough for the largest ships.

Farther south, indenting the mainland of North Carolina, are two large sounds, Albemarle and Pamlico. Into Albemarle Sound flow the waters of the Roanoke and a number of smaller rivers; and Pamlico Sound receives the waters of the Pamlico and Neuse rivers. These sounds were formed in the same way

Fig. 152. Logs ready for the mill on the coastal plain of South Carolina

Fig. 153. Canal in the Dismal Swamp

as the Chesapeake Bay, but their waters are shallow and can be safely used only by smaller vessels. They are separated from the ocean by a long chain of narrow, sandy "barrier" beaches, built up by the waves and winds. From these beaches a number of capes extend into the ocean, and the shoals near them are very dangerous to navigation. Off Cape Hatteras is one of the most stormy and dangerous parts of the Atlantic.

Farther to the south, the bays are smaller, but they too are due to the sinking of the land; and the rivers, such as the Savannah, admit the tides to the inner edge of the coastal plain.

A flat country close to the sea level may have many swamps. The South Atlantic States have several that are very large. One of them is the famous Dismal Swamp, 30 miles long and 10 miles broad, in Virginia and North Carolina. A part of it has been drained by a canal cut through from Norfolk, Virginia, to Elizabeth City in North Carolina, and much of the drained area has been cleared and brought under cultivation. The Dismal Swamp Canal (Fig. 153) is one of the works that make it possible for the smaller ships engaged in the Atlantic coast trade to make use of 2500 miles of protected inland waterways; other canals so used are Cape Cod Canal and the canal connecting Delaware and Chesapeake bays.

A much larger swamp is the Everglades of southern Florida (Fig. 154). The central part appears to be occupied by shallow water covering a layer of muck. In this muck, tough, sharp-edged saw grass takes root and grows to a considerable height. In the shallow waters are also many islands, some large and some small, covered with a dense growth of grass, underbrush, and trees. So luxuriant is the growth of saw grass, and so intricate is the maze of waterways, that parts of the Everglades are difficult to explore. As in the Dismal Swamp, however, large parts of the Everglades have been drained by canals and brought under profitable cultivation.

Many of the rivers, such as the Potomac and the James, are large streams where they cross the Fall Line (Sec. 47), and the rapids and falls there furnish water power. Among the larger cities that have grown up on or near the Fall Line are the following: Washington and Alexandria on the Potomac River; Richmond on the James; Raleigh near the Neuse; Columbia in South Carolina; Augusta on the Savannah, in Georgia; and Macon, also in Georgia.

Just west or northwest of the coastal plain is the Piedmont Plateau (Sec. 47). Most of this region is a rolling upland from 500 to 1000 feet above the sea; it is a belt of good farming land.

Fig. 154. A treeless part of the Everglades

Fig. 155. Mt. Mitchell, North Carolina

Fig. 156. Stalactites in the Luray Cavern

The Appalachian Mountains rise steeply from the Piedmont. The eastern part of these mountains is the Blue Ridge (Figs. 16, 64). The Potomac cuts through the Blue Ridge by a deep gorge at Harpers Ferry. Southward the Ridge rises, broadens, and includes Mt. Mitchell (Fig. 155) and other peaks in North Carolina (Sec. 14). The mountains continue into South Carolina and northern Georgia. In the heart of these mountains in North Carolina is Asheville, 2000 feet above the sea, and surrounded by forests and peaks. This region is one of the most popular of the southern summer resorts. It is often called the "Playground of the South."

133. The Great Appalachian Valley.—West of the Blue Ridge, in Maryland, Virginia, and West Virginia, are other ridges belonging to the Appalachians. But directly west of the Blue Ridge these other mountain ridges are so much worn down that a broad valley runs between mountains on either side, through Maryland and Virginia, into Tennessee and Alabama. This is the Great Appalachian Valley. In Virginia it contains the Shenandoah River and part of the upper James; and in southwestern Virginia and Tennessee it is drained by the Tennessee River and some of its tributaries.

This is not a valley carved out by a single stream, but one that has been made by the wasting of softer rocks, between mountain ridges of harder rocks. Many of the rock beds (Sec. 45) in the Great Valley are of limestone. Water slowly dissolves them, and this is one reason why there is a valley. Where water works for a long time underground in limestone it makes *caverns*. In places some of the dissolved lime may be deposited again by the evaporation of dripping waters, so that beautiful pendants, called *stalactites*, are formed. This explains the shaping of the Luray Cavern (Fig. 156) in the Great Valley in Virginia. In places a stream may flow some distance underground in a cavern, wearing away the bottom and sides. When most of the roof falls in, leaving a little still standing, we have a natural bridge. The best known of such formations is the Natural Bridge in the Great Valley of Virginia (Fig. 157).

Fig. 157. The Natural Bridge. Height, 263 feet. On the top is a road

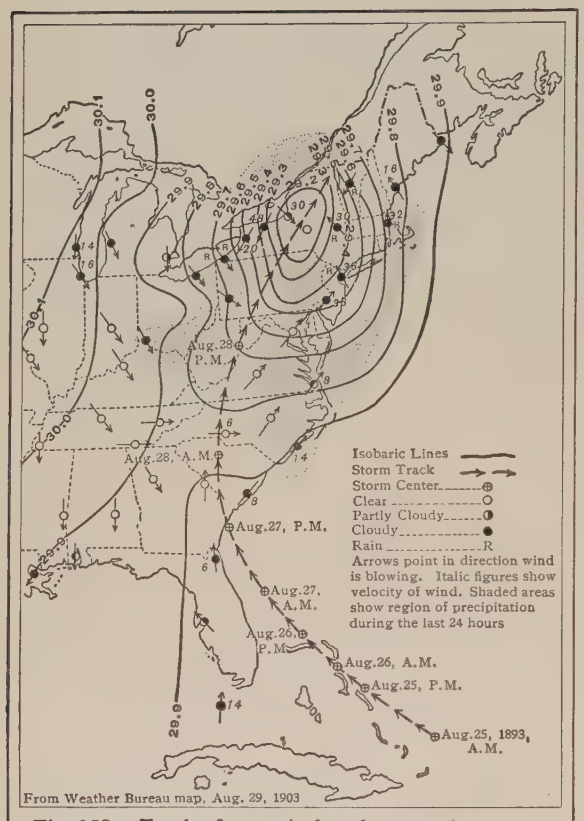


Fig. 158. Track of a tropical cyclone moving northward over the Atlantic coast region

134. Climate. — This group of states extends from about 25° to about 40° north latitude. The difference of nearly 15° in latitude makes much difference between the temperatures of northern Maryland and of southern Florida (Secs. 25 and 59). There is rarely a frost in southern Florida, while on the coastal plain in Maryland and Virginia freezing weather may occur from late October to early April. In central Florida the growing season averages 300 days, and on the plains of Virginia 200 days. Even this is 50 days longer than in central New York or Nebraska (Fig. 71).

The effects of altitude in these states are marked. On the low coastal plain flourish crops requiring a relatively high temperature, such as cotton and rice. The cooler Piedmont and mountain valleys grow such crops as corn, hay, tobacco, and wheat, common crops of temperate regions. In the mountain forests are trees of the kinds found in the lowlands farther north. There are numerous summer resorts among the mountains, for the days there are pleasantly cool even when the lowlands are hot.

The nearness of the sea makes the lowlands much warmer in winter and slightly cooler in summer than they would otherwise be. The waters of the Gulf Stream are near the shore, and south winds bring the warm, moist air to the land. This explains the heavy rainfall of all this coast region and of the southern Appalachians (Sec. 60).

Occasionally a tropical cyclone, or *hurricane*, originating in the West Indies, moves northward over the eastern United States or along the Atlantic coast (Fig. 158).

St. Augustine, Jacksonville, Palm Beach, Miami, Tampa, and other cities in Florida are places of resort for many who, for the sake of health and for pleasures in the open air, seek to escape the severe winters of the northern states. St. Augustine, originally a Spanish settlement, is known as the oldest city on the mainland of the United States. It was founded in 1565.

Review. — 1. What physical regions are included in the South Atlantic States? 2. What has resulted from the sinking of the coast? 3. Where is Cape Hatteras, and for what is it well known? 4. Name and locate two large swamps on the coastal plain. 5. For what is the Fall Line important? 6. Describe the Piedmont Plateau and state why it is so called. 7. Where is Harpers Ferry? 8. Where is Asheville and what is its altitude?

9. What rivers flow in the Great Appalachian Valley? 10. What cavern is found in this valley in Virginia? What are stalactites? 11. How may a natural bridge be formed?

12. About how many degrees of latitude are covered by this group of states? About how many miles, allowing 69 miles for each degree? 13. Give the length of the growing season in Virginia and in Florida. 14. How does the climate of the coastal plain differ from that of the lands farther west? 15. What storms affect the coast region?

MINERAL WEALTH AND FORESTS

135. Useful Minerals and Rocks.—The chief natural wealth of the South Atlantic States is in their thousands of square miles of good soil. In most of these states building stones, clay, and cement materials also abound. The soft coal belt surrounding Pittsburgh extends through western Maryland and is very important in West Virginia (Fig. 159). Coal is mined also in Virginia. West Virginia has much petroleum and is rich in natural gas. The mineral mica, which splits into thin, transparent sheets and is generally used in stoves, is more extensively mined in the mountains of North Carolina than anywhere else in the United States. Small quantities of gold are found in the mountain belt. Beds of phosphate rock occur in parts of Florida and South Carolina, and large quantities are mined for use as a fertilizer. Iron ore also is found, and West Virginia manufactures much iron.

Fig. 159. Coal mine and coke ovens, West Virginia

136. Hardwood Forests.—The hardwood forests are most extensive in North Carolina, but are found in all the states that reach into the mountains. The common kinds of trees in these forests are oak, ash, maple, chestnut, hickory, black walnut, and birch. A large amount of lumber is produced, and in some regions the forests have been entirely cut away. On the slopes thus left bare the heavy rains have cut gullies and washed away much soil (Fig. 122). In such regions, after each rain storm the water flows into the streams very quickly, making disastrous floods down the river valleys; and when the dry season comes on there is often not enough water to furnish power for mills and factories. In order to preserve some of the forests, protect valleys from floods, and maintain water power, the government is acquiring land for an Appalachian forest reservation (Fig. 160).

U. S. Dept. of Ag., Forest Service

Fig. 160. Part of the Appalachian National Forest

137. Pine and Cypress.—In Georgia and other states a hard pine, with long leaves, abounds. This is known as Georgia pine. The wood is especially good for floors and other interior work. The cypress is another common tree of the southern coastal plain, and is now much used for building material.

138. Turpentine and Tar. —Pine trees abound in all the coastal states from North Carolina to Texas, and their sap is used for making turpentine, rosin, and tar. The great pine belt that stretches along the Atlantic coast from North Carolina to Florida furnishes about nine tenths of the world's supply of these products. The trees are tapped and the sap is caught in earthen jars or buckets fastened to the trees (Fig. 161). The sap is distilled to form turpentine, and what is left is rosin. Pine tree roots, as well as other parts of the trees, are used in the manufacture of tar. The tar may be made by burning the wood under a cover of earth to keep out most of the air, or by heating the wood in a closed retort or oven.

U. S. Dept. of Ag., Forest Service

Fig. 161. Gathering pine sap, Ga.

North and South Carolina formerly led in this industry, but Florida and Georgia now lead, and these *naval stores*, as turpentine, rosin, and tar are called, are made also in Alabama, Mississippi, and Louisiana. Much of the product goes to the port of Savannah to be shipped to the various markets.

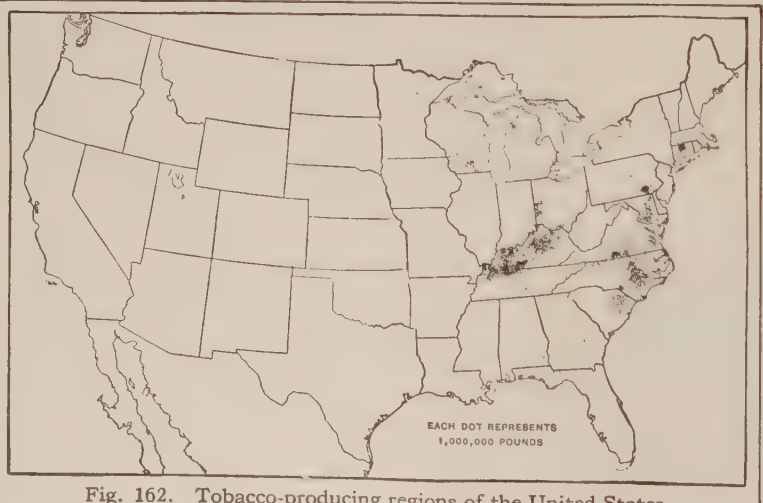


Fig. 162. Tobacco-producing regions of the United States

AGRICULTURE AND OTHER INDUSTRIES

139. Tobacco.—The tobacco plant is a native of the New World and hence was not known in Europe or Asia until America was discovered. The raising of tobacco was first developed as an important industry in the colonies of Virginia and Maryland. During the early days tobacco was used in place of money, and for a long time it was one of the largest exports to Europe. The ships sailed up the tidal rivers to the farmer's wharf and took his crop of tobacco to London. In time the culture of tobacco spread into the Carolinas and across the mountains to Kentucky and Tennessee. Although mainly cultivated in these southern states, it also grows farther north, especially in Ohio, Wisconsin, Pennsylvania, and Connecticut (Sec. 86).

Almost all the tobacco in this country is raised east of the Mississippi River (Fig. 162). Kentucky grows the largest crop, and North Carolina ranks second, followed by Virginia and Tennessee, in the amount of tobacco produced. The fine quality of much of the North Carolina tobacco gives it special value, so that this state stands first in the value of its tobacco crop.

Richmond is a very large tobacco market and manufacturing center, and much tobacco is manufactured also at Durham and Winston-Salem in North Carolina, and at Key West and Tampa in Florida. A part of the tobacco used in Key West and Tampa is raised in Cuba.

140. Rice and Other Food Grains.—Some rice is raised in the four most southern states of the group, especially in the lowlands of South Carolina, which used to be the leading state in growing this crop. But Louisiana, Texas, Arkansas, and California are now by far the greatest rice-growing states, and more is said about this crop in describing the agriculture of the South Central States. Other cereals, or food grains, are raised in the South Atlantic States in larger quantities than rice,—among them wheat and especially corn. But the study of these cereals is taken up in connection with the North Central States, where the largest wheat and corn crops are grown.

Fig. 163. Cotton bolls

141. Cotton.—Cotton was cultivated in India in southern Asia long before the New World was discovered, and cloth made from this "tree wool," as it was called, was very highly valued. Columbus found a variety of the cotton plant growing in the West Indies in 1492, and later explorers found cotton cloth in common use for clothing in Mexico. It was also well known in Peru and Brazil in South America. At the present time much cotton is grown in North America, Asia, and Africa, and smaller quantities in South America, southern Europe, and Australia. In the South Atlantic States cotton is grown from Virginia southward, chiefly in Georgia, South Carolina, and North Carolina.

There are several varieties of cotton, classified according to the length of the fiber. Most of the crop in our country has short fibers,—that is, from $\frac{5}{8}$ inch to $1\frac{1}{16}$ inches in length. The fiber of Egyptian cotton and some other varieties is from $1\frac{1}{4}$ to $1\frac{3}{4}$ inches long.

Cotton is raised on plantations; that is, on large farms devoted mainly to this crop. In our country it is grown each year from the seed and can be produced only in regions which are free from frost for seven months of the year. About three months after planting, the blooms appear, and the seed pods, or bolls, are soon formed. To the seeds in the boll are attached the fluffy masses of white fiber, or lint. The bolls open as they ripen, and the pickers go over the fields several times to gather such of the masses of lint as are ready to be picked (Fig. 163). The lint, with seeds attached, is then taken to the ginhouse, where the cotton is ginned; that is, the lint is separated from the seeds.

It was really the invention of the cotton gin that made possible the development of

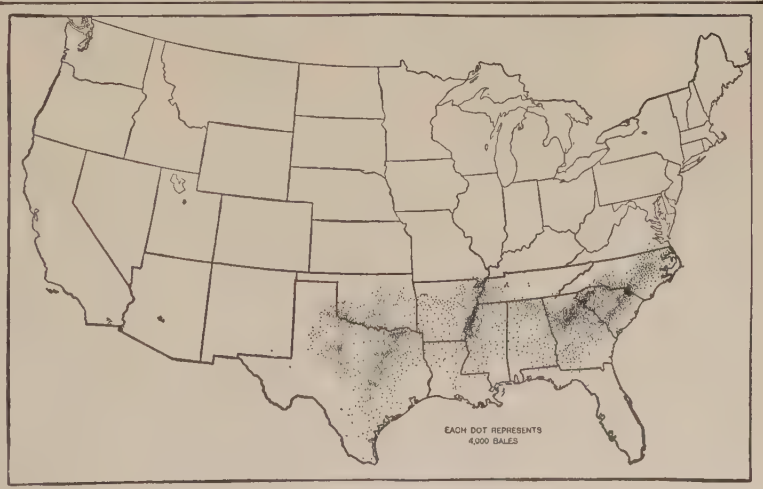


Fig. 164. Cotton-producing regions of the United States

the modern cotton-growing industry of the South. For years the lint had been separated from the seed by hand, a much slower and more expensive process. The gin is a machine that does this work of separating the lint from the seed, and its use has greatly lessened the cost of production. In one form of gin the lint is pulled from the seed by rollers which do not allow the seeds to pass between them. In another kind of gin the lint is pulled from the seed by the teeth of revolving saws.

The cotton lint, after being separated from the seeds, is pressed into bales of about 500 pounds each and sent to market. It may go to cotton mills in or near the state in which it is raised, or it may go to New England or to a foreign country. Vast quantities of cotton are sold for the mills in England, and much goes to all the other great countries of Europe, for the United States raises about two thirds of the cotton supply of the world.

Fig. 165. Making the warp for cloth in a southern cotton mill

Texas raises more cotton than any other state. It is interesting to notice, however, that the area of Texas is almost twice as great as the combined area of North Carolina, South Carolina, and Georgia, which together have a cotton crop larger than that of Texas. Savannah and Charleston are the chief cotton ports on the Atlantic coast. From these ports the cotton goes by coasting vessels to northern cities, or by other ships to Europe.

142. **Cotton Seed.** — The cotton seeds, except those needed for the next year's crop, were formerly thrown away. Now the seeds are hulled and ground and the oil pressed out. This cottonseed oil is used as a substitute for olive oil, is burned in miners' lamps, and is used in making cottolene, a substitute for lard. Both the cottonseed hulls and the meal that is left after the oil has been pressed out of the ground seeds, are used as food for stock. They are fed to dairy cows not only in our own country and Canada but also in several European countries.

143. **Cotton Manufacture.**—For a long time the cotton states sent away all their cotton, but now there are many mills in the South. These southern mills have been built near the Fall Line and in the Piedmont, where water power is furnished by the streams that flow from the upland forests. There are many great cotton factories in North Carolina, South Carolina, and Georgia. The southern states now use more bales of cotton than they send to New England factories. The modern cotton mills of the South are among the finest in our country (Fig. 165). They give employment to many workers, and some of the goods manufactured find a ready sale in such widely scattered markets as Central America, South America, China, and Africa.

144. **Peanuts and Other Crops.** — Another crop of the South Atlantic States, particularly in North Carolina and Virginia, is the peanut, a semi-tropical ground nut. In the autumn the vines are pulled (Figs. 166, 167), the nuts are cleaned, and many are sent to Norfolk, in Virginia, to be shipped to various parts of this country and to Europe. The peanut is really an excellent food and it is now being prepared in several forms, such as peanut butter.

Fig. 166. A peanut plant

Fig. 167. Stacking peanut plants after they have been pulled

Another product, the sweet potato, is raised as far north as New Jersey. It grows best, however, in a warm, sunny climate with a long growing season, and the South is its natural home. It is very extensively used in the South, but part of the crop is sent to northern markets.

Tropical fruits are raised in Florida in great abundance, and this is one of our chief fruit-growing states. Of these tropical fruits the best known is the orange. The grapefruit (Fig. 168), which is much like the orange, is increasing in popularity for table use. It is light yellow in color, much larger than an orange, and has a slightly bitter taste. The pineapple crop also is large.

Throughout the South much interest is taken in the study of the best methods of agriculture. This "scientific farming," as it is called, has led to a large increase in production and an improvement in the quality of the more important crops, as well as the introduction of many new ones.

145. **Truck Farming.** — In all the northern cities there is a market for fresh vegetables and fruits out of season, that is, long before they will ripen in the North. To meet this demand and that of the southern cities, truck farming has come to be a great industry on the coastal plain of the South Atlantic States. The use of cold storage and fast ships and trains makes it possible to carry such perishable products as strawberries, lettuce, radishes, and watermelons for long distances. Strawberries (Fig. 169) are a good example, for the ripening season begins in the far south in late winter or early spring, is later as we go northward, and occurs in June and July in the northern states. These differences in climate, with good transportation, make the strawberry market last several months in some cities.

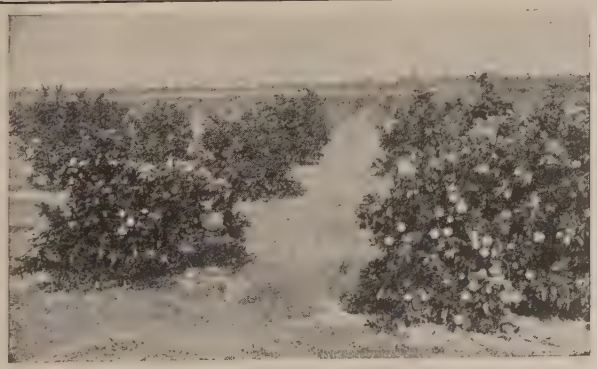


Fig. 168. Growing grapefruit in Florida

Fig. 169. Shipping strawberries to northern markets

146. Fisheries.—Oysters are found in the warm, shallow waters of many of the bays along the Atlantic and Gulf coast from Cape Cod to Galveston. They reach their best development along the Atlantic coast from Cape Cod to Cape Hatteras. The principal place for this industry is Chesapeake Bay, with Long Island Sound second in importance. The oysters are gathered up from the sea floor by the use of long-handled "tongs" or by means of a dredge, and several thousand boats are used by the oystermen in gathering them (Fig. 170). The oysters are landed at Baltimore, Hampton in Virginia, and other ports. Some of the oysters are canned, but the greater part of them are shipped fresh to market, even long distances, either in their shells or after being "shucked."

Fig. 170. Oyster boats at Baltimore

Atlantic waters yield also crabs and various fish, such as shad, Spanish mackerel, and menhaden. The menhaden are small fish used to produce oil and fertilizer.

147. Power Development.—The increasing need of power for the growing industries of the South has led to a careful study and a partial development of its water power resources (Fig. 171). In some cases the power is converted into electrical energy and transmitted to mills at a distance. The swift streams in the mountains with their numerous waterfalls, are capable of developing enough power to make the South one of the great manufacturing regions of the world.

Fig. 171. Dam of a hydroelectric plant, near Atlanta

Review.—1. Which of the South Atlantic States have coal beds? 2. Which has petroleum and much natural gas? 3. What use is made of phosphate rock? In which states is it found? 4. What other minerals are found in this group of states?

5. What will be the advantages of an Appalachian forest reservation? 6. What are the important trees of these states? 7. What substances besides lumber are made from some of them? How are they made?

8. Give some facts about the history of tobacco in the colonies. 9. What are the important states for raising tobacco? 10. What cities in the South Atlantic group are important in the manufacture of tobacco?

11. Name the most northern state in which cotton is raised. 12. Where is sea island cotton raised? What are its qualities? 13. Describe the cotton boll. 14. What is a ginhouse? 15. About how much cotton is contained in one bale? 16. What is the leading state in the raising of cotton? 17. Name two important ports for shipping cotton.

18. What are some of the products of the cotton seed? 19. What change has taken place in the location of cotton mills?

20. Where are peanuts grown? 21. What fruits are raised in Florida?

22. Give an account of southern truck farming for northern cities.

23. Where are the principal oyster fields? Name a center for oyster canning.

24. What parts of the South Atlantic States have much water power? Why?

CITIES AND ROUTES OF TRADE

Fig. 172. The oversea railroad to Key West

148. Seaports.— On Hampton Roads, formed by the broad mouth of the James River where it joins Chesapeake Bay, are the cities and harbors of Norfolk, Portsmouth, and Newport News. Early vegetables (Sec. 145), peanuts, and cotton are shipped from Norfolk, which is visited by steamships of many lines. At Newport News is a large shipbuilding plant. Near the city is Old Point Comfort, a place of resort; and a few miles up the James River is the site of Jamestown, the first successful English settlement in America.

Fig. 173. Shipbuilding in Wilmington, Delaware

Wilmington is the principal seaport of North Carolina, Charleston of South Carolina, and Savannah of Georgia. Wilmington's importance as a seaport is increasing. Among the industries of this city are the manufacture of lumber, the canning of vegetables and fruits, the extraction of oil from cotton seed, and the handling of naval stores. Savannah and Charleston are among the chief ports of the South engaged in shipping lumber and cotton.

Jacksonville, on the St. Johns River near the ocean, is the chief port on the Atlantic side of Florida. It ships the natural products of the lowlands that lie back of it, including oranges, garden truck, and lumber. Key West, built on an island off the coast of Florida, is joined to the mainland by a railroad that reaches it across many islands and over many bridges (Fig. 172). Key West is a naval station of the United States, and is the headquarters for the sponge fisheries of the Gulf of Mexico. Tampa and Pensacola are the chief Gulf ports of Florida.

Delaware has one large city, Wilmington, which contains nearly half the people of the state. This city is near the Delaware River, at the junction of two small streams. Explosives, cars, and ships are among the chief products (Fig. 173).

Most of the cities on the Fall Line are inland places, at or near the head of navigation on some river. The greatest of the Fall Line cities, however, is Baltimore, a seaport near the head of Chesapeake Bay.

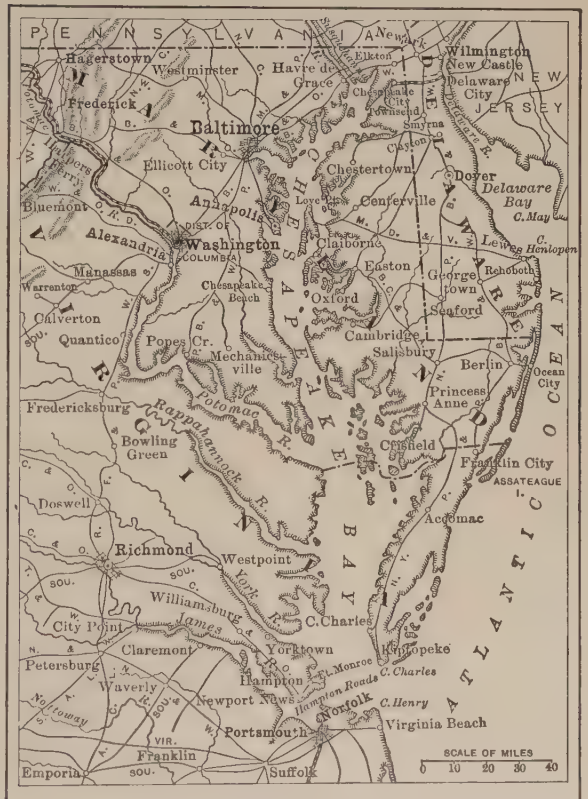


Fig. 174. Chesapeake Bay region

Largely because of its position, it has grown to be one of the leading commercial and manufacturing cities of the country. It contains more than half of the population of Maryland, and is the largest city in the South Atlantic group of states. It was named for Lord Baltimore, the founder of Maryland.

Ships of several Atlantic lines run between Baltimore and European ports. The Baltimore and Ohio Railroad, begun as one of the earliest of American railways, extends westward from Baltimore to the Ohio River, Cincinnati, St. Louis, and Chicago. The city is on the main line of traffic which joins the northeastern cities to the national capital and the South. The chief manufactures of Baltimore are metal goods, clothing, and fertilizers. The canning of fruit, vegetables, and oysters is an important industry.

Fig. 175. A business street in Atlanta

Baltimore is the seat of Johns Hopkins University.

Annapolis is the capital of Maryland and is the seat of the United States Naval Academy.

149. **Other Important Cities.**—Cumberland, in the mountains of Maryland, is a railroad center, and deals in coal, lumber, and iron. Of the larger cities of West Virginia, Wheeling and Huntington are on the Ohio River, and Charleston, the capital, is on the Kanawha. Wheeling is not far from Pittsburgh, and like its larger neighbor it is engaged in the smelting of iron and the manufacture of iron products. Huntington has manufactures of railroad cars and glass. Clarksburg is another important center of glass making.

Richmond, the capital and chief city of Virginia, is at the head of navigation on the James River. Not only is it a great center for the manufacture and marketing of tobacco, but it has large locomotive works and other factories. At Roanoke are large railway repair shops. Lynchburg and Petersburg are other manufacturing centers. At Charlottesville, in the Piedmont country, is the University of Virginia, one of the oldest and best known of American universities.

Through lines of railroad run from Baltimore and Washington, along the coastal plain, to Florida. The country is so flat that little grading was necessary in building the roads. Another line runs from Richmond through the Piedmont region, to Atlanta, the capital of Georgia. On this line are several manufacturing cities, including Danville, Virginia, the center of a rich tobacco region; Charlotte, North Carolina, and Spartanburg, South Carolina, both of which are centers of cotton manufacture. Raleigh, the capital of North Carolina, is on another division of the same road. Other railroad lines pass from Baltimore, Washington, and Richmond, through gaps in the Blue Ridge, into the Great Appalachian Valley (Sec. 133). They run through this valley southwestward, to Chattanooga in Tennessee, and Atlanta, the capital of Georgia.

Atlanta is at the southern end of the Appalachian Mountains, where the railroads of the Piedmont belt and the Great Valley meet. Railroads also join Atlanta to Savannah, and to the important Gulf ports and western cities. After Baltimore and Washington, Atlanta is the largest city in this group of states. It is appropriately called the "Gate City." Its manufacturing industries are large and re-

markably diversified. Forests, cotton fields, coal, and iron are not far away. Some of the largest cotton mills of the South are here. Having abundant raw materials for mills, and being a railroad center, Atlanta is a progressive and growing city (Fig. 175).

Augusta, Macon, and Columbus, on the Fall Line, have large cotton mills.

Fig. 176. The Capitol at Washington

Review.—1. What cities are on Hampton Roads? 2. Name the chief ports of North Carolina and Florida. 3. Give the location of Wilmington, Delaware, and name its chief industries. 4. To what physical region does all of Delaware belong? 5. What means of communication, by land and water, has Baltimore? 6. What are its leading industries?

7. Give the location and industries of Wilmington, North Carolina. 8. What are the Fall Line cities of Virginia? 9. Give an outline of the railroad connections of Atlanta. 10. What are the important industries of Wheeling?

THE NATIONAL CAPITAL

150. Washington.—Between Virginia and Maryland is the District of Columbia, containing the national capital. The limits of the city and those of the district are the same. The district is under the authority of Congress. This place was selected for the capital in 1790, and George Washington marked out its boundaries in 1791. The city is not far below the Falls of the Potomac, and is therefore near the Fall Line. Washington is called "the city of magnificent distances." This name was first given because the city was planned so large and the buildings were far apart.

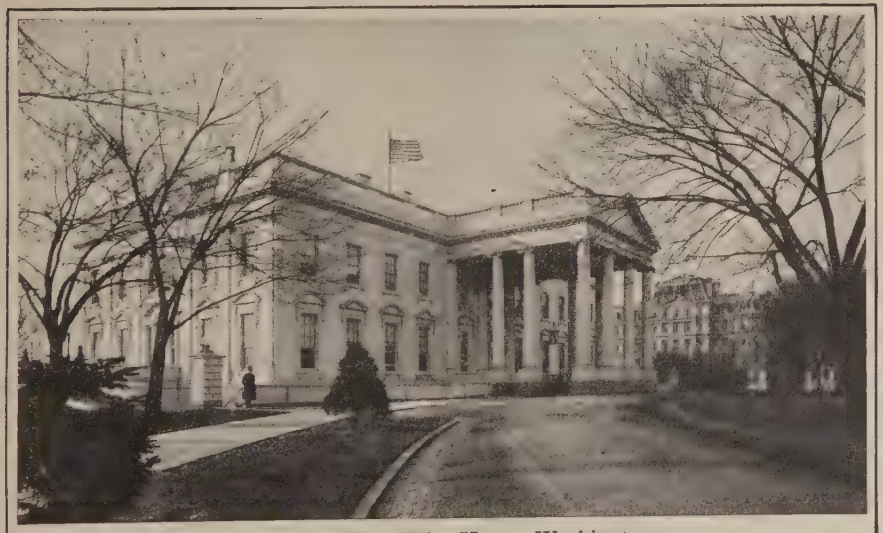


Fig. 177. The White House, Washington

Among the notable buildings are the Capitol (Fig. 176), the White House (Fig. 177), which is the home of the President, the Congressional

Library, the National Museum, and the buildings of the various departments of the government. Washington is now beautiful, and when present plans are carried out it will be one of the finest of all cities. It is the headquarters of many organizations, and is the seat of several universities, including Georgetown University, George Washington University, and the Catholic University of America.

Washington has nearly half a million inhabitants. It has few manufactures, and its trade meets only the daily needs of its people. It is thus very different from Baltimore, Pittsburgh, or Boston. It has grown because it is the capital of a great country. Some officers of the government live here during a part of the year, and many thousand workers in the various government departments make their homes in Washington. In addition, the foreign embassies make it necessary for a considerable number of people of other nations to live in the city, and there is a throng of visitors who, for politics or pleasure, come to the national capital at all seasons.

Review by States. — Maryland (Md.). 1. What kind of surface has eastern Maryland? western Maryland? 2. What river discharges its waters into the head of Chesapeake Bay? 3. What important river is on the border of the state? 4. What is the largest city of Maryland? 5. From what states can coal readily be brought to Baltimore? For what is this coal used? 6. What is the chief product of the waters of Chesapeake Bay? 7. What is the density of population of Maryland (Fig. 80)? How does Maryland compare with your state in this respect?

Delaware (Del.). 8. Compare Delaware with Rhode Island, in size and in population. 9. What waters are on the east of the state? 10. What is the chief city? 11. What are its leading industries?

District of Columbia (D.C.). 12. Give some facts about the history of the national capital. 13. How does it differ from other large American cities? 14. What classes of people make up much of its population? 15. Why is the capital not more centrally located with reference to our country as a whole?

Virginia (Va.) 16. On what river was the earliest English settlement in America made? 17. Where is the Fall Line on this river? 18. To what regions does the surface of Virginia belong? 19. What are the seaports of Virginia? 20. What important product is marketed and manufactured in Richmond? 21. Make a sketch map of Virginia, showing the boundaries, the Blue Ridge, and the chief rivers and cities.

West Virginia (W.Va.). 22. To what region does this state mainly belong? 23. What city stands where the Potomac flows through the Blue Ridge? 24. To what great coal field do the West Virginia coal beds belong (Fig. 127)? 25. What navigable river is on the border of the state? 26. What are the chief cities of West Virginia? 27. What are their industries?

North Carolina (N.C.). 28. Describe the surface of North Carolina. 29. What two sounds are along the shore line? 30. Why have these waters no great seaports? 31. What is the chief seaport of this state? 32. Give the name and location of the capital. 33. Name a city of the Piedmont belt. 34. What is the principal city in the Appalachian belt? Why is it much visited? 35. Name the chief products of North Carolina.

South Carolina (S.C.). 36. What is the chief port of South Carolina? 37. What city is on the Fall Line? 38. Why has South Carolina become a cotton-manufacturing state? 39. What parts of South Carolina produce sea island cotton? 40. What are the exports of Charleston?

Georgia (Ga.). 41. What kind of surface has southern Georgia? 42. Where are the mountainous districts of the state? 43. To what kind of tree has the state given a name? 44. What is the chief seaport of Georgia? 45. Name three products that would naturally come here in large quantities, for shipment. 46. What is the largest city of the state? 47. Where is it located? 48. What great railroad routes give it communication? 49. What are its chief industries? 50. Compare its population with that of Richmond, Baltimore, and Albany (see table of Cities in the Appendix).

Florida (Fla.). 51. Has Florida any uplands? 52. Has Florida any beds of coal? 53. Would the state be likely to become a manufacturing center? 54. What are the chief products of the soil? 55. What fertilizer is found here? 56. What are the principal seaports? 57. What fact is of special interest in the situation of Key West? 58. What ancient Spanish settlement is in this state?

THE SOUTH CENTRAL STATES

151. Early Settlement.—Within the South Central region are some of the oldest and some of the newest settlements west of the Appalachians. Originally explored by the Spanish, much of the region was later claimed and partly settled by the French, who approached it from the north by way of the Mississippi Valley, as well as along the Gulf coast.

There were two reasons why Frenchmen were so active in exploration. The first of these was that they were anxious to convert the Indians to Christianity, and with most of the expeditions the Catholic missionary went as a leader. The other reason was that the French early learned to make a profit out of the fur trade, and each expedition sought to gain in that way.

Fig. 178. North wall of the Cumberland Gap, through which Boone made his way

Most of the territory east of the Mississippi River was taken from France by the English in war (1754–1763), and afterwards was made part of the original United States. By the Louisiana Purchase of 1803 (Sec. 66), our own government secured a vast territory west of the Mississippi River.

In the early days frontiersmen from Virginia and other states followed the Great Appalachian Valley into the region that is now eastern Tennessee and made homes there. On the western side of the valley is a deep gap in the Cumberland Mountain (Fig. 178). Through this gap Daniel Boone and others made their way to the Blue-grass country. These daring pioneers hunted, built log cabins, fought the Indians, and laid the foundations of the first states west of the mountains, Kentucky and Tennessee.

For many years Texas was a part of Mexico, but in 1836 the Texas people declared themselves independent, and nine years later Texas became a part of the United States. This added to our country a vast territory of fertile fields and rich grasslands, for Texas is by far the largest of our states.

For a long time Oklahoma was known as the Indian Territory, because many Indians were placed there on reservations by the government. When the western half — the first to be called Oklahoma — was opened for settlement by white people (beginning in 1889), there was a rush for homes and farms, and within a few years it had a population of several hundred thousand. The eastern half was Indian Territory until 1907. There are now more Indians in Oklahoma than in any other state.

Throughout this entire South Central region agriculture and grazing were for many years almost the only industries of importance. Later lumbering also became important. In recent years the discovery of useful minerals and of the mineral oil, petroleum, has led to much activity in mining and to a rapid development of manufacture in metals.

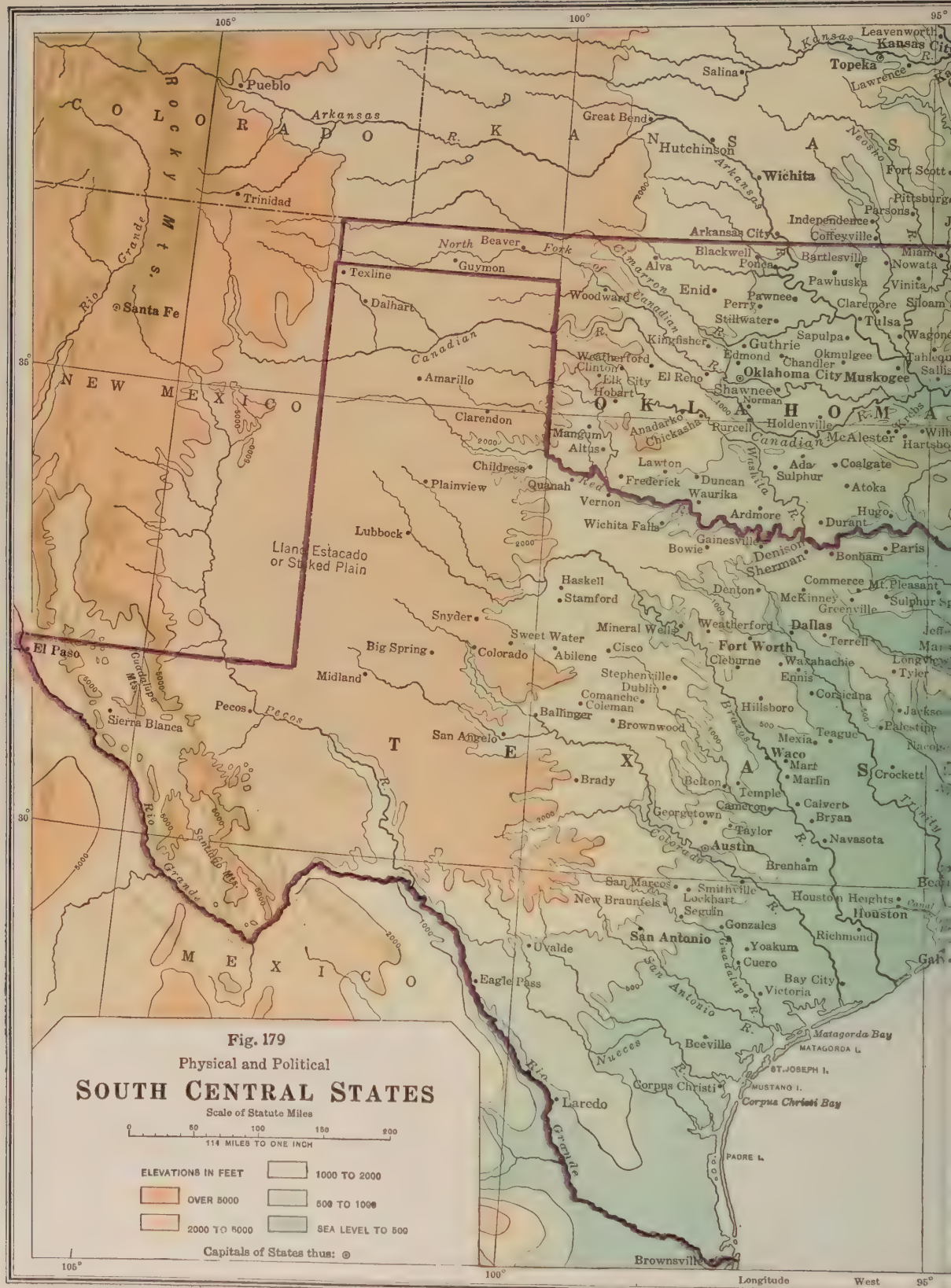


Fig. 179

Physical and Political

SOUTH CENTRAL STATES

Scale of Statute Miles

0 50 100 150 200

114 MILES TO ONE INCH

ELEVATIONS IN FEET

OVER 5000

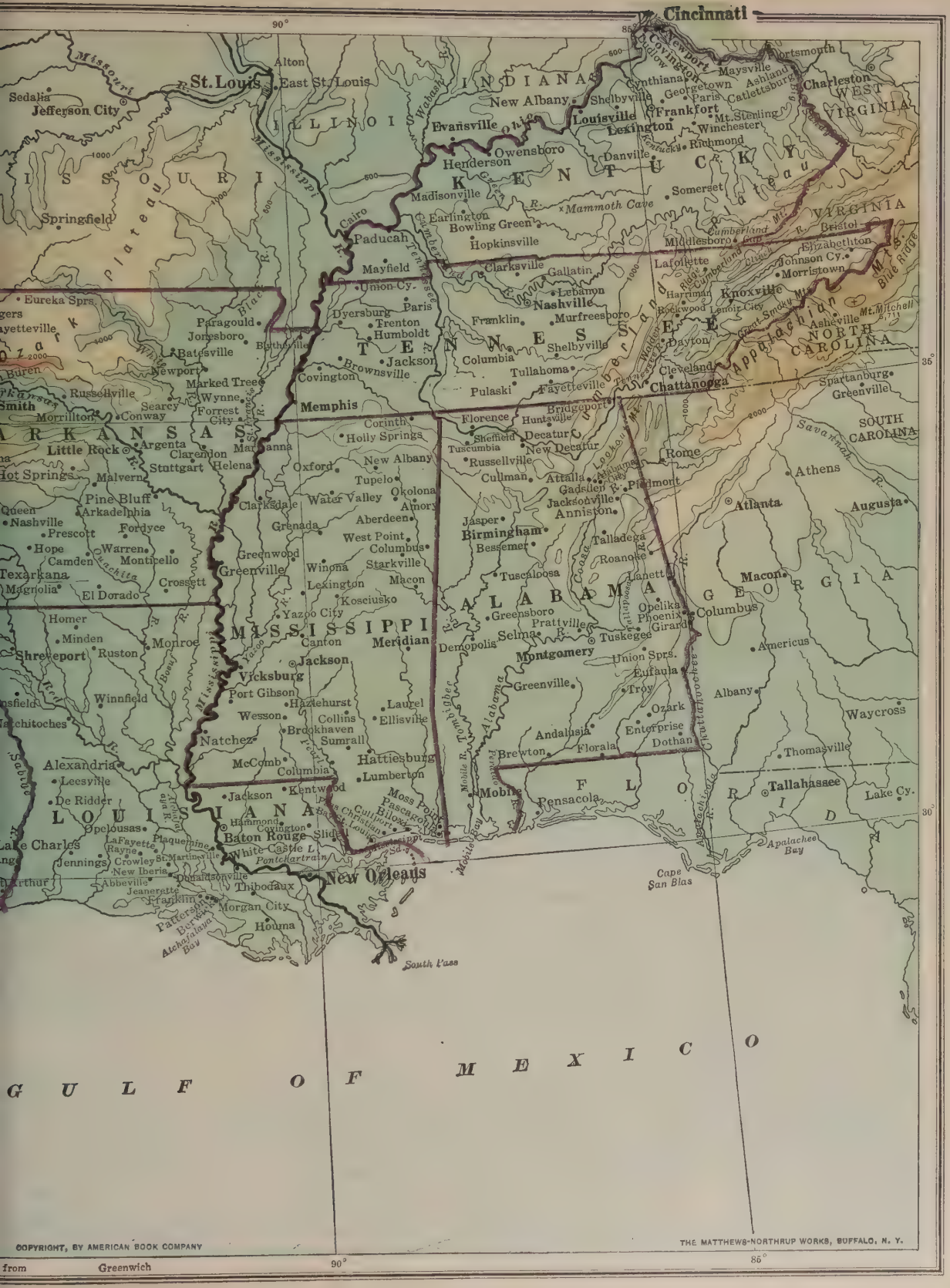
2000 TO 5000

1000 TO 2000

500 TO 1000

SEA LEVEL TO 500

Capitals of States thus: ◎



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THE MATTHEWS-NORTHRUP WORKS, BUFFALO, N. Y.

from Greenwich 90° 85°

THE SOUTH CENTRAL STATES

	Area Sq. Mr.	Population, 1920	Capital
Kentucky . .	40,598	2,416,630	Frankfort
Tennessee . .	42,022	2,337,885	Nashville
Alabama . .	51,998	2,348,174	Montgomery
Mississippi . .	46,865	1,790,618	Jackson
Arkansas . .	53,335	1,752,204	Little Rock
Louisiana . .	48,506	1,798,509	Baton Rouge
Oklahoma . .	70,057	2,028,283	Oklahoma City
Texas . . .	265,896	4,663,228	Austin

Map Study.—1. What states belong to the South Central group? 2. Which of them border the Mississippi River on its east bank? On its west bank? 3. Which have no seacoast? 4. Give the boundaries of Texas. 5. What is the most conspicuous feature of the shore line? 6. Find two cases in which a bay and a city on its shore bear the same name?

7. What rivers serve, for a part of their course, as state boundaries? 8. Trace the course of the Tennessee River; of the Cumberland River. 9. What rivers of this group of states enter the Gulf of Mexico east of the Mississippi River? West of the Mississippi River? 10. Trace the course of the Red River; of the Canadian River.

11. A degree of latitude covers about 69 miles. Refer to the map of the South Atlantic States and find how much farther south Florida extends than Texas.

12. Name and locate the capital of Tennessee; of Texas; of Oklahoma; of Mississippi; of Arkansas. 13. Locate San Antonio, Houston, and Dallas in Texas; Louisville in Kentucky. 14. What large city is in north-central Alabama? 15. What large city is on the Mississippi River, not very far from its mouth?

PHYSICAL FEATURES

The South Central group includes eight states, of which four border the Gulf of Mexico, namely, Alabama, Mississippi, Louisiana, and Texas. The interior states of the group are Tennessee and Kentucky on the east of the Mississippi River, and Arkansas and Oklahoma on the west.

152. Gulf Plains.—The southern parts of the Gulf states are flat lowlands. In all the states except Louisiana and parts of Mississippi, these lowlands are coastal plains, like that of the South Atlantic States. That is to say, they are old sea bottoms that by elevation have become dry land.

153. Mississippi Flood Plain and Delta.—The surface of Louisiana is a plain made mainly by the Mississippi River and its branches, in the form of delta and flood-plain deposits (Secs. 18, 20). To make the lowlands of the coastal plain, a sea bottom has risen above sea level. To make the river plains, a shallow sea has been filled by waste brought from the land.

Below the mouth of the Ohio River the Mississippi flows through flood plains many miles wide. They are bordered in a number of places by high bluffs on the east or west. Memphis in Tennessee, and Vicksburg and Natchez in Mississippi, are examples of cities perched on these bluffs, overlooking the river and its lowlands (Fig. 180).

In Louisiana the flood plain merges into the delta which forms the southern part of that state. Here are many channels, or distributaries, which break off from the main river and enter the sea at several points along the Gulf of Mexico, thus distributing the water of the river to various parts of the sea border.

Fig. 180. Memphis on the bluffs along the Mississippi River

Mississippi River Commission

Fig. 181. A Mississippi levee in time of high water. Notice that the houses are at a lower level

154. Levees.—When a river overflows, it drops some of its muddy load on its banks. This makes the ground next the stream higher than the ground farther back from the river. Along these banks man builds high embankments called *levees* (Fig. 181), to keep the river from flooding the lower lands back from the channel. Many levees have been built along the banks of the lower Mississippi. During the ordinary stages of high water they afford ample protection to thousands of square miles of the bordering lowlands. But when a break, or *crevasse*, is made in a levee, or when the water rises so high as to overflow it, widespread and disastrous floods occur, doing great damage to cities and to farms.

In the lowlands on each side of the main stream, in parts of the flood plain as well as in the delta, there is a network of small streams called *bayous*. The stream channels are poorly defined, and much of the land which separates them is swampy and is covered with a heavy growth of underbrush.

155. Floods.—We can understand why the Mississippi River is subject to floods. Its great eastern branch is the Ohio, and from that tributary the Mississippi receives the greatest part of its flood water. Look at the map and see how the branches of the Ohio reach into the highlands, all the way from New York to Alabama. All these highlands have ample rainfall. Consequently there is much water to flow from them, and as the slopes are steep, the rivers rise rapidly after a storm, and the lower Ohio and lower Mississippi are flooded. Reservoirs to hold back these flood waters have been proposed, but their construction would be very expensive. The Weather Bureau keeps flood stations on the Ohio River, the Mississippi, and many other rivers, to warn people of the rising of the waters, so that they can guard against damage to shipping, wharves, buildings, and crops (Fig. 182).

Fig. 182. Cities where the government maintains flood stations

Fig. 183. Jetties at the mouth of the South Pass of the Mississippi

156. Meanders.—The lower Mississippi has many bends (Sec. 19). It often cuts across the necks of these bends and leaves them as crescent-shaped lakes. Where the river is the boundary, such a change may transfer a farm from one state to another. The lower course of the river changes so much by cutting its banks and filling its bed that navigation is always difficult and sometimes dangerous. It requires much skill to pilot a Mississippi steamer.

157. Jetties.—Where the Mississippi enters the Gulf of Mexico it deposits a part of the load of mud that it is carrying and makes the water shallow (Sec. 20). For many years after New Orleans was settled the shallow waters at the mouth of the river did not seriously interfere with the commerce of the city. Ships at that time were small and had little difficulty in reaching the city to unload their cargoes and load again.

As the country grew and commerce increased it became more profitable to use large ships. These larger ships sank deeper into the water and found greater difficulty in reaching New Orleans from the Gulf. It became necessary to use small vessels called lighters in loading and unloading the larger ships, which remained in the Gulf at the mouth of the river. This was so expensive that the United States government decided to remedy the trouble by building jetties at the mouth of the South Pass.

The jetties are artificial river banks which narrow the river channel and thus make the water flow faster. As a result the river is not only able to carry along the material which it formerly dropped, but it is also able to pick up fine particles of mud and thus scour the channel deeper. The depth of the river channel is now about 30 feet. In building the jetties piles were driven into the mud of the river bottom on each side, and mattresses, made by lashing together many slender willow trunks and branches, were sunk between the piles. The mattresses soon filled with mud and made a solid wall (Fig. 183).

158. Appalachian Valley.—Read what is said in Section 133 about the Great Appalachian Valley. On the map (Fig. 179), follow this valley from Virginia into Tennessee. Here on the Tennessee River are the cities of Knoxville and Chattanooga. The valley is 40 miles wide, has rich farms, and is bordered on the east by the "Great Smoky Mountains," as the southern end of the Blue Ridge is often called. On the west, the Cumberland Plateau rises by a steep slope above the valley. Looking again at the map, follow the valley from Tennessee through the northwest corner of Georgia into Alabama, until it runs out on the coastal plains. In this part of the valley is the city of Birmingham, with its iron furnaces and other industries.

159. Cumberland Plateau.—West of the Great Valley is the southern part of the Appalachian Plateau (Sec. 49). It is called the Cumberland Plateau, and forms a large part of Kentucky, central Tennessee, and northern Alabama. The Tennessee River leaves the Great Valley at Chattanooga (Fig. 25) and flows for much of its lower course through the plateau. The course of the Cumberland

River is also largely in the plateau. South of Louisville, in the southern part of Kentucky, is the famous Mammoth Cave. It is much larger than the Luray Cavern (Sec. 133), although formed in a similar way; indeed, it is the most extensive cave known. It has streams, waterfalls, many large rooms, and 150 miles of passages.

Fig. 184. In the Blue-grass region of Kentucky

160. Blue-grass Region.—In the north-central part of Kentucky is a region of about 10,000 square miles known as the "Blue-grass region" (Fig. 184). It is so named from a kind of grass that grows in the meadows and pastures. The soil is made by the wasting of the limestones which lie below (Sec. 105), and it is one of the finest farming soils in the world. The people throughout this region are very prosperous, as rich soils when properly farmed yield large crops, and these provide money for homes, food, and clothing, for education and travel.

161. The Region West of the Mississippi River.—This region varies much in surface and rainfall. West of the Mississippi are the lowlands of eastern Arkansas, which belong partly to the Arkansas River and partly to the flood plains of the Mississippi River. The western part of the state is an upland, with low, wooded mountains. These mountains extend westward into the eastern part of Oklahoma. In the interior of Texas, beyond the coastal plain, the surface rises sharply and becomes a part of the Great Plains (Sec. 51). In western Texas are mountains which rise at one point to an altitude of 9500 feet. Oklahoma has a large area of prairies like those of the North Central States. At the west it reaches into the belt of the higher and drier country called the Great Plains.

162. Climate.—The rainfall of the South Central States, east of the Mississippi River, varies from about 60 inches in southern Alabama, Mississippi, and Louisiana to about 45 inches in northern Kentucky (Fig. 72). It decreases in amount as the distance from the Gulf increases, because most of the rain that falls in these states sweeps over the land with the winds from the Gulf. The rainfall of western Texas and Oklahoma is less than that in the eastern part of the group. This is because the Gulf winds do not reach that western section, and moisture from the Pacific Ocean is shut out by the western mountains.

Along the coast the summer temperature is moderated by the Gulf winds and the heat is never extreme. Farther inland the summer temperature is somewhat higher. The winter temperature seldom falls to the freezing point along the Gulf. In the uplands and farther north, however, snow is not uncommon, and ice several inches in thickness forms on the surface of quiet waters during the coldest weather.

One of the climatic peculiarities of this group of states is the bitterly cold storms that sometimes sweep over the western part during the winter. During these storms, which blow from the north and are therefore called *northers*, the temperature occasionally drops 50° in a few hours.

The leading crops of the southern part of this group of states are those of warm countries. The crops of the northern part of the group are for the most part those of temperate latitudes.

Fig. 185. A Texas cotton field

Review.—1. What are the Gulf Plains, and where are they? 2. What state is mainly a plain made by the Mississippi River?

3. What are levees? 4. Along what part of the Mississippi has it been necessary to build levees? 5. What is a break in a levee called? 6. What are bayous? 7. What causes great floods in the lower Mississippi River? 8. How has it been proposed to check these floods? 9. How are the residents of flood districts warned of the approach of floods?

10. Describe the jetties at the mouth of the Mississippi River and state their use.

11. What cities of this group of states are in the Great Valley? 12. What name is given to the Appalachian Plateau in Kentucky, central Tennessee, and northern Alabama? 13. Where is the Mammoth Cave? 14. How are such caverns formed? 15. Give the name of the most fertile part of Kentucky and the reason for its fertility.

16. Which part of Arkansas is a lowland? By what rivers was it formed? 17. Which part of Arkansas is upland? 18. Describe the surface of Texas; of Oklahoma.

19. In what part of the South Central States is the rainfall heavy? Why? 20. Where is it very light? Why? 21. What are northers?

AGRICULTURE

163. Cotton (Secs. 141–143).—In spite of the fact that manufacturing is developing rapidly in the South, agriculture is still the most important industry of the South Central States. In all the states of this group except Kentucky, cotton is an important crop, and Texas is the leading state of the Union in its production (Figs. 164, 185). India is second to the United States in the raising of cotton, and Egypt and China stand next; yet Texas raises more cotton than all India, and more than Egypt and China combined. Cotton is one of our largest exports to Great Britain, France, Germany, Italy, Belgium, and Japan.

When the cotton of the South Central States is ready to be shipped it is sent by rail or boat, principally to Galveston, Houston, New Orleans, and Mobile. Then, if it is to be sent abroad, it goes by ship to Liverpool, Havre, Bremen, Genoa, or some other port.

Fig. 186. Cotton compress, Oklahoma City

From these ports it is distributed to mills in many cities, and the finished cotton goods are sent to markets all over the world. Much of our cotton, however, is sold directly to the southern cotton mills or sent to mills in New England or the North Atlantic States.

There are many steps in the cotton industry, from the planting of the cotton seed to the cotton garment. Picking is almost the only one of the processes that is performed by hand (Fig. 185), and some cotton picking machines are in use.

Fig. 187. Sugar cane in Louisiana

164. Sugar.—Nearly all the sugar cane in the United States is raised in Louisiana, on the rich lands of the Mississippi delta. Some is raised in Georgia and in other states of the far South. Sugar cane is cultivated in nearly all the tropical and semitropical countries of the world. It was introduced into Louisiana by the French in 1751, but it was not until some varieties of cane from Java were introduced in 1820 that the industry became really important.

The plant grows from 10 to 16 feet high (Fig. 187). The stems are from one to two inches thick and contain a pith filled with a sweet juice, from which the sugar is made. Each cane is made up of sections connected by knots called nodes. Each node has a bud or eye, and if a piece of the cane is planted, the eye will grow and produce a young cane. Therefore a part of each year's crop of cane is saved for planting, although seed could be used if necessary. The soil is usually prepared for the crop by throwing it up into ridges six or seven feet apart. A furrow is opened in the top of the ridge, and cuttings or whole canes are put in and covered with soil.

When the cane is ripe, it is cut close to the ground and taken to a mill where it is crushed between rollers to squeeze out the sweet juice (Fig. 188). By various processes, including boiling, this is changed into crude brown sugar and molasses. Much of the brown sugar is sent to refineries in northern cities, to be made into the various kinds of white sugar that we see on our tables.

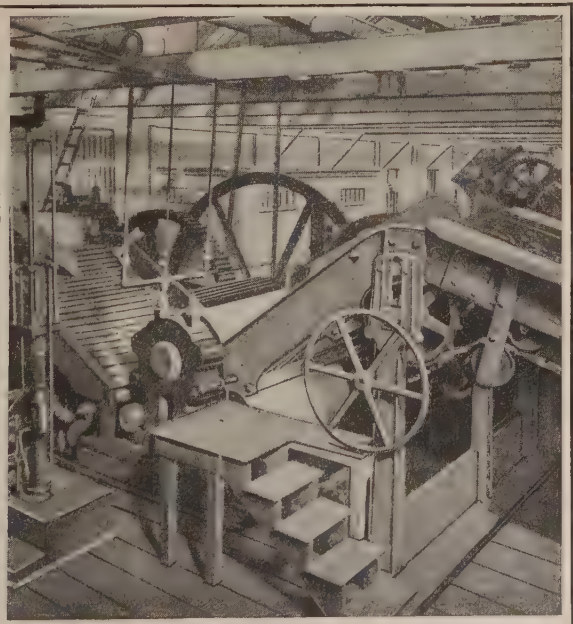


Fig. 188. Mill where sugar cane is crushed

Nearly all the sugar of the world was formerly made from cane. But it has been

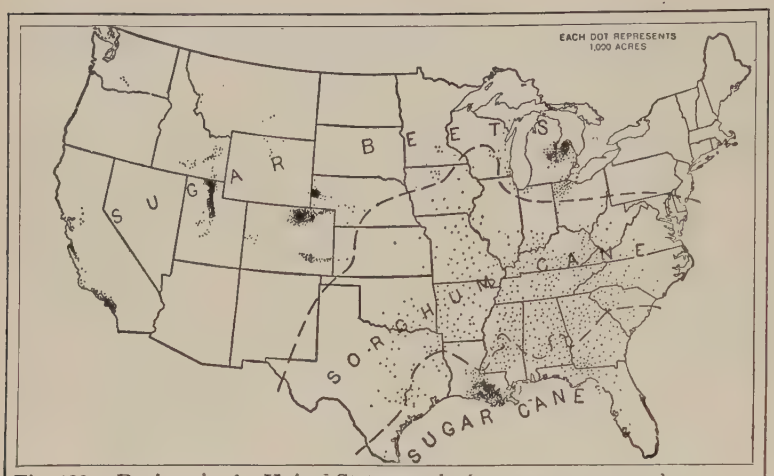


Fig. 189. Regions in the United States producing sugar cane, sorghum cane, and sugar beets

found that sugar can be made from some kinds of beets. As beets will grow in a cooler climate, many states and countries in the temperate latitudes can now make their own sugar. This way of getting sugar has made such progress that Germany and some other countries of Europe no longer import sugar, and some of them even export large quantities. Some beet sugar is made in the United States, but not so much as we use. Colorado, Michigan, Utah, and California are the leading beet sugar states, and beet sugar is made also in Idaho, Ohio, and other states (Fig. 189).

We import a great deal of cane sugar from Cuba and the Hawaiian Islands, and some from the Philippines, besides smaller quantities of beet sugar from Europe.

Sugar is made from the sap of maple trees in Vermont (Sec. 93) and in some other northern states, but the amount of maple sugar produced is very small compared with the cane and beet sugar production.

Sugar can be made also from the juice of sorghum, a tall plant that grows somewhat like corn, and is raised in many states for fodder and for making sirup.

165. Rice.—Rice belongs to the group of food plants known as cereals. Large crops are raised in southeastern Asia and the islands of the East Indies. It supplies the principal food of several hundred million people. It thrives only in a warm climate, and the best kinds of rice are grown on flat ground where plenty of water can be used. During a part of the growing period such rice fields must be flooded, and this is done two or three times between planting and ripening. Upland rice does not require flooding, but little is grown.

When ripe, rice is harvested and threshed in much the same way as other grains. The kernel has a clinging hull, and the rice is put through a machine that removes this coat and polishes the grains, leaving them ready for market.

There is much level land in Louisiana, Arkansas, and Texas, so located that it can be flooded by the use of water pumped from deep wells into a system of irrigation ditches. Such a region is well adapted to the rice crop, as it is easy to flood the fields for the planting season and yet drain off the water so that they will be dry during the harvesting of the crop (Fig. 190).

Fig. 190. Harvesting rice in Arkansas

This makes it possible to harvest the

crop by machinery instead of by hand. As the crop is afterward threshed by machinery the cost of production is still further lessened. Rice can thus be grown in our country for less than in China, where the work is all done by hand, even though the laborer in China is paid only a few cents a day for his work. Louisiana, Texas, Arkansas, and California are the great rice-growing states of our country; and South Carolina and a few other states produce smaller quantities.

Ky. Agricultural Experiment Station

Fig. 191. Cutting hemp, Kentucky

More than two hundred years ago a Spanish sea captain, whose ship was in Charleston harbor for repairs, gave one of the citizens a handful of rice. The Charleston man planted it, and thus started the industry. The crop has increased very greatly in recent years, but not nearly enough is raised in this country to supply our people. Much of the rice that we import comes to us from Burma.

166. Other Crops.—Much corn is raised in every South Central state, but this grain is studied especially under the North Central States, where still larger crops are produced. Wheat is grown in Kentucky, Tennessee, and Texas, and large crops are raised in Oklahoma, which is just south of Kansas, one of the great wheat states of the North Central group.

Hemp is grown in Kentucky. It is a tall plant (Fig. 191) which yields coarse fibers used for making bags and the sails and cordage of ships. Much hemp is raised also in Russia. The Manila hemp that is brought to this country from the Philippine Islands comes from a different plant.

Fig. 192. A field of tobacco, Kentucky

Kentucky leads all other states in the raising of tobacco; it produces about one third of the crop of the United States (Figs. 192, 162). As our country is a large exporter of tobacco, much of the Kentucky crop is sent to European countries. Louisville, on the Ohio River close to the tobacco district, is the greatest tobacco market in the country (Fig. 200), and has large tobacco factories.

167. Cattle Raising.—In the drier part of Texas many cattle are raised, for grass will grow on the plains where there is hardly enough rain for cultivated crops. The cattle are pastured on ranches. Some of them are fattened for market on the home ranch, others are sent to farmers in the corn belt farther north to be fattened.

Review.—1. In what states of this group is cotton grown? 2. How does Texas rank as a cotton-growing state? 3. What are the chief cotton ports of the Gulf of Mexico? 4. Name some of the foreign countries to which our cotton is sent. 5. What work connected with cotton growing is still done by hand?

6. In what states is sugar cane grown? 7. Describe the plant and the method of cultivation. 8. What processes are necessary for making cane sugar? 9. From what other plants is sugar made?

10. To what group of useful plants does rice belong? 11. Where in this group of states is it raised? 12. Why can it be cultivated so cheaply in these regions? 13. How did the rice-growing industry get its start in this country? 14. Name two other cereals of which large crops are raised in this group of states.

15. What use is made of hemp fiber? 16. What state grows hemp? 17. From what other countries do we get hemp? 18. How does Kentucky rank as a tobacco-growing state? 19. What city is the greatest tobacco market in our country?

20. In what state are many cattle raised?

Fig. 193. Cypress forest, Mississippi

LUMBER AND MINERAL WEALTH

168. Lumbering.—There are great forests, especially of pine and cypress (Fig. 193), in the Gulf states, and hardwoods in the higher lands of the interior. These forests make this group of states one of the chief lumber regions of the country. Logs cannot be hauled on sleds as they can be over the snows of New England, and it is not a common practice to float them downstream to mills. In the Gulf Plains there is so little water power that the logs are hauled to mills which use steam for power. Many portable steam mills are set up in the woods. Such a mill is kept in one place until the logs of a small district are worked up; then it is taken to some other part of the forest.

Memphis, the largest city in Tennessee, is on a bluff overlooking the Mississippi River. Across the river is Arkansas, and just to the south is Mississippi. These three states have extensive forests. As ships can reach Memphis from the Gulf, and as the city has many railroads, it has become one of the chief lumber markets of the country, especially for hardwoods. Its factories make furniture and planing mill products, such as blinds, sashes, and doors.

The lumber industry is important also in many other cities and villages in the South. For example, Shreveport, the second largest city in Louisiana, is a lumber-manufacturing center, and the chief industries of Fort Smith in Arkansas are based on the lumber industry. They include the manufacture of furniture, refrigerators, and wagons.

169. Iron and Coal.—Nearly all the states of this group have some coal, but the beds of coal in Kentucky, Tennessee, and Alabama are especially important. The soft coal beds about Pittsburgh in Pennsylvania extend westward into Ohio and southward into West Virginia, and continue southwest into the three states mentioned above (Fig. 127).

Texas and Arkansas have some iron, but the largest beds of the ore in this part of the United States are in Tennessee and Alabama, in the Great Appalachian Valley. There are also beds of limestone in the same region. As the iron ore and limestone are near the coal fields, it does not cost very much to bring together these three heavy materials for the manufacture of iron and steel.

Birmingham, in Alabama (Fig. 194), is in the center of a region rich in iron, coal, and limestone, and these natural advantages have made it second only to Pittsburgh as a center of the iron industry in this country. Birmingham was named after a great iron-working city of England. In the ten years beginning in 1900 it showed a larger percentage of increase of population than any other city in the United States of over 25,000 inhabitants. This rapid growth was due to the iron industry. Many people are needed to work the mines, railroads, and furnaces, and many others to supply food, clothing, and other necessary articles to the workers. The cities of Rome and Atlanta in Georgia, and Chattanooga and Knoxville in Tennessee, also share in the iron industry of the South (Fig. 195).

170. Sulphur.—An industry of great importance in Texas and Louisiana is the mining of sulphur. The deposits are found along the coast of the Gulf of Mexico. They are in beds several hundred feet underground, where they were first located through borings made in a search for petroleum. Wells are sunk to the sulphur beds, and very highly heated water—much hotter than steam—is forced down them under great pressure. The sulphur is melted by the heat of the water. It flows to the surface and is stored in large bins where it quickly cools, forming solid blocks of almost pure sulphur.

171. Other Mineral Products.—Knoxville, in the Great Valley, is near beds of marble and deposits of iron, copper, and zinc. Tennessee has also large deposits of phosphate rock, one of the most valuable mineral fertilizers. In Arkansas as well as Tennessee are found deposits from which aluminum is made, and fine hard sandstones used for whetstones.

Petroleum and natural gas are found in Oklahoma, Texas, Louisiana, Arkansas, and Kentucky. The oil region of southern Texas and southern Louisiana is known as the Gulf oil field. Much oil has been found also in the northern parts of these states, and the railways of Texas make much use of crude petroleum for fuel. The Oklahoma oil field is a still larger producer, yielding about a third of the annual output of petroleum in the United States. Beaumont, Texas, has large oil refineries.

Beds of salt are found in both Louisiana and Texas.

Review.—1. Where are forests found in the South Central States? 2. What methods are used in cutting the trees into lumber? 3. Name three cities which are lumber markets. 4. What are some of the industries that depend for their prosperity upon the lumber industry?

5. In what states are iron and coal found? 6. What state has large sulphur deposits? 7. How is the sulphur secured? 8. What state has marble? Phosphate rock? 9. What states produce petroleum? 10. Where is salt found?

Fig. 194. A business street in Birmingham

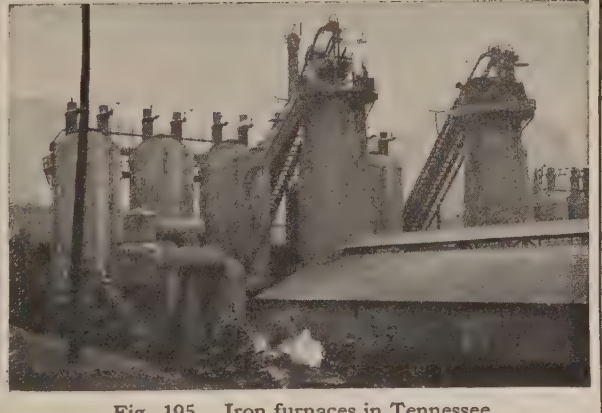


Fig. 195. Iron furnaces in Tennessee

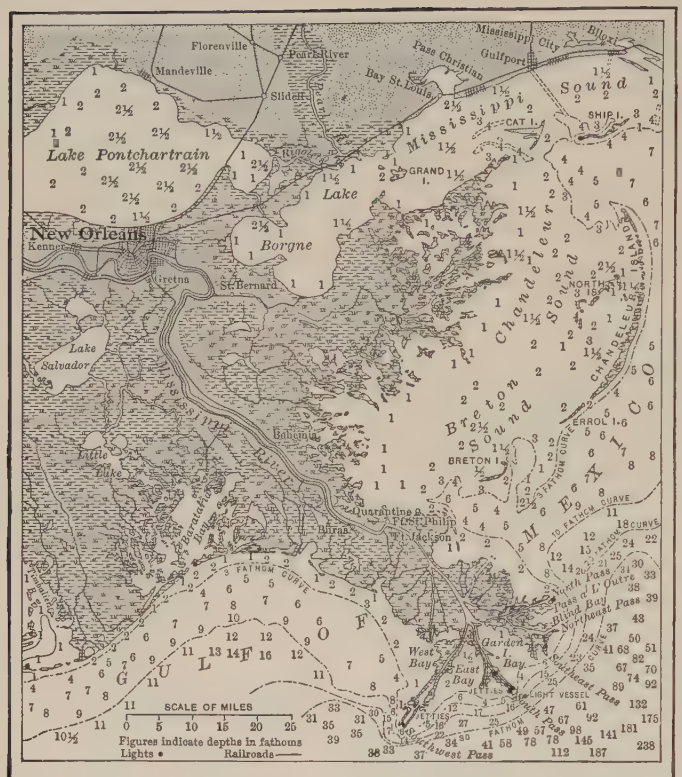


Fig. 196. Vicinity of New Orleans

CITIES AND ROUTES OF TRADE

172. New Orleans.—The largest city of this group of states is New Orleans. French people were so numerous among the early settlers of New Orleans that their language is still used by many of their descendants. The descendants of both French and Spanish in this region are sometimes called *Creoles*. In the French quarter, not only the language, but the houses, the narrow streets, and the customs are like those of a foreign city. Tulane University, at New Orleans, is one of the largest universities in the South.

New Orleans has more than fifty miles of waterfront for shipping. The southern part of the city lies in a bend of the Mississippi, and New Orleans is often called The Crescent City. The city also fronts on Lake Pontchartrain. An industrial canal and inner harbor join the Mississippi and Lake Pontchartrain, offering ample accommodation for ocean-going vessels. The city stands on low ground, while levees 20 feet high keep back the waters of the river. New water supplies, great grain elevators, and cotton warehouses are among recent improvements.

173. River Trade.—New Orleans is near the mouth of a long river and at the gateway of a vast, fertile lowland. It carries on a river trade with Vicksburg, Memphis, and St. Louis, and smaller boats are able to reach St. Paul, or to turn into the Missouri River and reach Kansas City. By way of the Ohio River, Louisville, Cincinnati, and Pittsburgh may be reached.

The rivers are not much used by passenger steamers now, because the railroads afford a more rapid means of transportation. Certain kinds of bulky freight take the river route because they can be carried cheaply. A barge load of coal may come down the Monongahela River to Pittsburgh. There it is lashed to many other barges and the fleet is pushed by a tugboat all the way to New Orleans. Wheat, flour, lumber, cotton, and tobacco form a part of the river freight.

At some future time, it is hoped, the Mississippi, Missouri, and Ohio rivers may be deepened and controlled so that ocean-going

Fig. 197. Unloading bananas at New Orleans. The fruit is taken from the ship by endless chain conveyors

Fig. 198. Ships loading cotton at Mobile

Fig. 199. River steamers at Nashville

steamers can reach the larger river ports. If this were done, iron or coal from Pittsburgh, flour from Minneapolis, meat from Kansas City, and cotton from Memphis, could be sent to all the ports of the world without the expense of unloading on the way.

By the Panama Canal a ship can go from New Orleans to ports on the Pacific Ocean as readily as it can to ports on the Atlantic. This has increased still further the importance of New Orleans as a shipping center.

Railroads enter New Orleans from the east, north, and west (Fig. 82).

174. Other Cities.—Galveston is one of the leading seaports of the United States. It stands on a low island at the mouth of Galveston Bay. In the year 1900 a storm wave from the Gulf swept over the city and did terrible damage. Since that time the city has built a sea wall seventeen feet high and more than three miles long for its protection. As Texas raises more cotton than any other state, its chief seaport, Galveston, exports much cotton (Fig. 9). Grain and live stock reach the city by railroads from the states west of the Mississippi River. Several steamship lines run between Galveston and Europe.

The deepening of the harbor of Houston, and the construction of a ship canal from this harbor to the Galveston jetties, have given Texas another important port. Houston ships cotton, cottonseed oil, rice, and lumber.

Austin is the capital of Texas, and the seat of the University of Texas. It is a live-stock, cotton, and wool market, and the trade center for the western and central parts of the state. San Antonio is the center of a live-stock and farming region, with growing manufactures and a large trade. Dallas is the principal shipping and financial center of Texas. It has a large trade in wheat, fruit, cotton, meats, and live stock, and manufactures leather goods, machinery, and cottonseed oil. Its printing business is large. At Fort Worth are stockyards and packing establishments. El Paso is a health resort and a center of trade with Mexico.

Mobile, on Mobile Bay, Alabama, is about one hundred miles nearer the Panama Canal than New Orleans is. It is the trade center for a large region, and ships cotton and lumber from the coastal plain (Fig. 198). Montgomery, the capital of Alabama, is in the center of the cotton-growing region of the state.

Meridian, Jackson, and Vicksburg, in Mississippi, are trading centers and shipping points for cotton, the growing of which is the leading industry of the state.

Nashville, on the Cumberland River (Fig. 199) is the capital of Tennessee. It has a wide range of manufactures and is a publishing center. Vanderbilt University and Peabody College for Teachers are among its important institutions of learning. Memphis is a cotton market and a lumbering center, and has cottonseed oil mills. Knoxville (Sec. 171) is the seat of the University of Tennessee, one of the large universities of the South.

Louisville is the chief city of Kentucky. It is a center of the tobacco industry (Fig. 200; Sec. 166), and has car shops, machine shops, and lumber factories. Covington is a trade center for a rich agricultural and stock-raising region, and Newport is a residential city next to Covington. Both of these cities are near Cincinnati, Ohio, and many people who work in Cincinnati have their homes in these Kentucky cities. Lexington is the chief city of the Blue-grass region. Paducah is in a rich agricultural district and has a large wholesale trade.

Fig. 200. Tobacco ready for shipment at Louisville

Little Rock is the capital and the principal city of Arkansas. Hot Springs is a health resort.

Oklahoma City is the capital and largest city of Oklahoma (Fig. 186). It is a center for meat packing and manufactures. Tulsa is the second city and Muskogee is in a thriving agricultural region.

Review by States.—Kentucky (Ky.). 1. What are the boundaries of Kentucky? 2. Where is the best region for agriculture? 3. What are the leading crops in the state? 4. Name and locate the chief city; the capital. 5. What Kentucky cities are near Cincinnati? 6. What is the density of population of Kentucky (Fig. 80)? How does it compare with that of Tennessee? Mississippi? Georgia? Pennsylvania?

Tennessee (Tenn.). 7. What is the largest city of Tennessee? 8. What is the capital? 9. What important rivers cross or border the state? 10. What uplands lie on either side of the Great Valley? 11. What cities are in the Great Valley? 12. What are some of their industries? 13. Name two educational centers in the state.

Alabama (Ala.). 14. What is the seaport of Alabama? 15. What is the capital? 16. What is the chief interior city? 17. Why has this city grown so rapidly in recent years? 18. How does its growth compare with that of other large cities? 19. Describe the surface of Alabama.

Mississippi (Miss.). 20. What are the boundaries of Mississippi? 21. What is the capital? 22. How is Vicksburg situated? 23. What large cities in adjoining states are near Mississippi? 24. What is the leading business of the state?

Arkansas (Ark.). 25. What river is on the eastern border of Arkansas? 26. What other river has wide flood plains in the state? 27. What is the capital? 28. What is the chief city? 29. What useful rock is found in this state?

Louisiana (La.). 30. What is the character of the surface of Louisiana? 31. What rivers are on the eastern and western borders? 32. What is the largest city in the South Central States? 33. Describe the city. Why is it an important trade center? 34. What freight is carried on the Mississippi River? In which direction? 35. Why cannot large ships be used in this trade? 36. What crops does Louisiana produce? 37. Draw a map of Louisiana, showing rivers and cities.

Oklahoma (Okla.). 38. Name a large river that crosses Oklahoma. 39. What river is on its southern border? 40. What crop in Oklahoma is grown also in the states north of it? 41. What crops are the same as those in states south and east of it? 42. Describe the surface and climate of the western part. 43. Give some important facts concerning the history of the state.

Texas (Tex.). 44. How does Texas rank in size with other states? 45. To what country did it once belong? 46. What natural boundaries has Texas? 47. Describe the surface of the southeastern part; of the central and northern part; of the western part. 48. In which part of the state are large crops raised? 49. What are the leading products? 50. Name two important seaports of Texas. 51. What great works have been constructed for these ports? 52. What are their great exports? 53. What are the leading cities of eastern Texas? 54. What city is in western Texas? 55. What is the density of population in Texas? 56. How many people would Texas have, if it were as densely populated as Rhode Island?

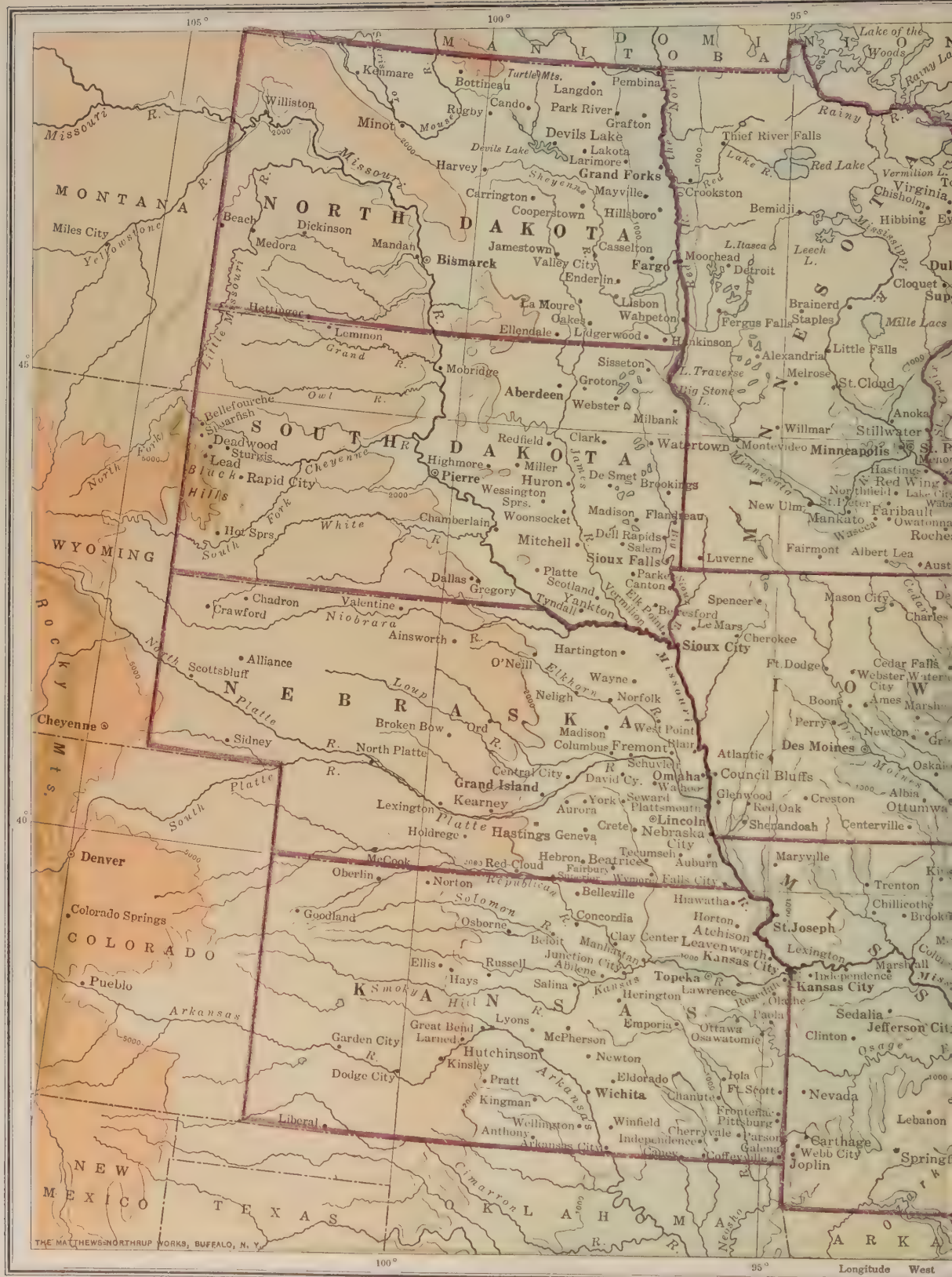
Fig. 201. A Dakota prairie. Harvesting wheat

THE NORTH CENTRAL STATES

175. Early Settlement.—The French missionaries, explorers, and traders were the first white men to make their way into that part of our continent from which the North Central States were later formed. These early explorers followed the water route of the St. Lawrence River and the Great Lakes into the interior. From several points on the Great Lakes they made their way up the courses of small streams flowing into the lakes, and across low divides to eastern tributaries of the Mississippi River. Down these they went to the main stream, which La Salle finally explored to its mouth.

A number of trading posts were established by the French, as they wished not only to convert the Indians to Christianity, but also to develop the fur trade. The trading posts thus established, however, were small, few in number, and widely scattered. It was only when much of the best land of New York, Pennsylvania, and other Atlantic states was occupied that real settlement of the North Central States began. Then the people of the East were attracted by the stories which they heard about the great fertile plains of the interior.

To Ohio, which was then in the "West," new settlers came by wagons from New England and New York. Their route was along the south shore of Lake Erie. Others from the East made their way across the highlands of Pennsylvania to Pittsburgh. From that place they floated down the Ohio River in boats to some point in Ohio, Indiana, or Illinois where they wished to take up land and make a home. Many, however, came to these states from Kentucky and other parts of the South. Michigan and Wisconsin were easily reached by the lakes, or across the plains that lay about them. Missouri was settled by men from both North and South. In the other North Central States west of the river most of the early settlers were from the North. Many of the later settlers are immigrants from Europe.


105°
100°
95°
MANITOBA
ONTARIO
MINNESOTA
NORTH DAKOTA
SOUTH DAKOTA
MONTANA
WYOMING
NEBRASKA
COLORADO
KANSAS
NEW MEXICO
TEXAS
OKLAHOMA
IOWA
MISSOURI
ARKANSAS
Missouri R.
Red R.
Rainy R.
Lake of the Woods
Rainy Lake
Kenmare
Bottineau
Turtle Mts.
Langdon
Pembina
Williston
Rugby
Cando
Park River
Grafton
Minot
Devils Lake
Lakota
Larimore
Harvey
Grand Forks
Carrington
Mayville
Thief River Falls
Crookston
Red Lake R.
Lake of the Woods
Bemidji
Hibbing
Virginia
Miles City
Beach
Dickinson
Medora
Mandan
Bismarck
Jamestown
Valley City
Casselton
Fargo
Moorhead
Detroit
L. Itasca
Leech L.
Cooperstown
Hillsboro
Enderlin
Yellowstone R.
Little Missouri R.
Heimdal
Lemmon
La Moure
Oakes
Lisbon
Wahpeton
Ellendale
Ludgerwood
Fergus Falls
Staples
Brainerd
Mille Lacs
Hankinson
Alexandria
Little Falls
Grand R.
Mobridge
Sisseton
Groton
Aberdeen
Webster
Big Stone L.
L. Traverse
Melrose
St. Cloud
Owl R.
Bellefourche
Milbank
Willmar
Stillwater
Anoka
Deadwood
Sturgis
Lead
Rapid City
Redfield
Clark
Watertown
Montevideo
Minneapolis
St. Paul
Black Hills
Cheyenne R.
Highmore
Miller
Pierre
Huron
De Smet
Brookings
Wessington Sprs.
James R.
Hastings
Red Wing
Northfield
New Ulm
St. Peter
Faribault
Mankato
Owatonna
Rochester
Hot Sprs.
White R.
Chamberlain
Woonsocket
Madison
Flandreau
Dell Rapids
Salem
Mitchell
Sioux Falls
Luverne
Fairmont
Albert Lea
Platte
Parker
Canton
Dallas
Gregory
Scotland
Yankton
Tyndall
Vermillion
Elk Point
Burbank
Spencer
Mason City
Cedar Rapids
Chadron
Crawford
Valentine
Niobrara R.
Ainsworth
Le Mars
Cherokee
Sioux City
Hartington
O'Neill
Elkhorn R.
Missouri R.
Ft. Dodge
Webster City
Ames
Boone
Marshalltown
Alliance
Scottsbluff
North Platte R.
Loup R.
Wayne
Norfolk
Neligh
Perry
Newton
Grinnell
Cheyenne
Broken Bow
Ord
Madison
West Point
Columbus
Fremont
Blair
Des Moines
Atlantic
Sidney
North Platte R.
Schuyler
Central City
David City
Omaha
Council Bluffs
Oskaloosa
Grand Island
Kearney
Lexington
Platte R.
York
Seward
Aurora
Plattsmouth
Glenwood
Creston
Albia
Ottumwa
Lincoln
Red Oak
Shenandoah
Centerville
Holdrege
Hastings
Geneva
Crete
Nebraska City
Denver
McCook
Red Cloud
Hebron
Beatrice
Tecumseh
Auburn
Fairbury
Maryville
Oberlin
Norton
Republican R.
Belleville
Wymore
Falls City
Trenton
Chillicothe
Brookfield
Colorado Springs
Goodland
Solomon R.
Concordia
Hiawatha
Horton
Osborne
Beloit
Clay Center
Atchison
St. Joseph
Leavenworth
Lexington
Pueblo
Ellis
Hays
Russell
Junction City
Abilene
Manhattan
Kansas R.
Topeka
Kansas City
Independence
Marshall
Salina
Lawrence
Herington
Olathe
Arkansas R.
Smoky Hill R.
Great Bend
Lyons
Emporia
Ottawa
Osawatomie
Paola
Sedalia
Jefferson City
Garden City
Larned
McPherson
Clinton
Hutchinson
Kinsley
Newton
Dodge City
Pratt
Eldorado
Iola
Ft. Scott
Nevada
Arkansas R.
Kingman
Wichita
Chanute
Liberal
Wellington
Winfield
Cherryvale
Pittsburg
Lebanon
Anthony
Arkansas City
Independence
Parsons
Galena
Carthage
Webb City
Joplin
Springfield
Coffeyville
Cimarron R.
Neosho R.
THE MATTHEWS-NORTHRUP WORKS, BUFFALO, N. Y.
Longitude West

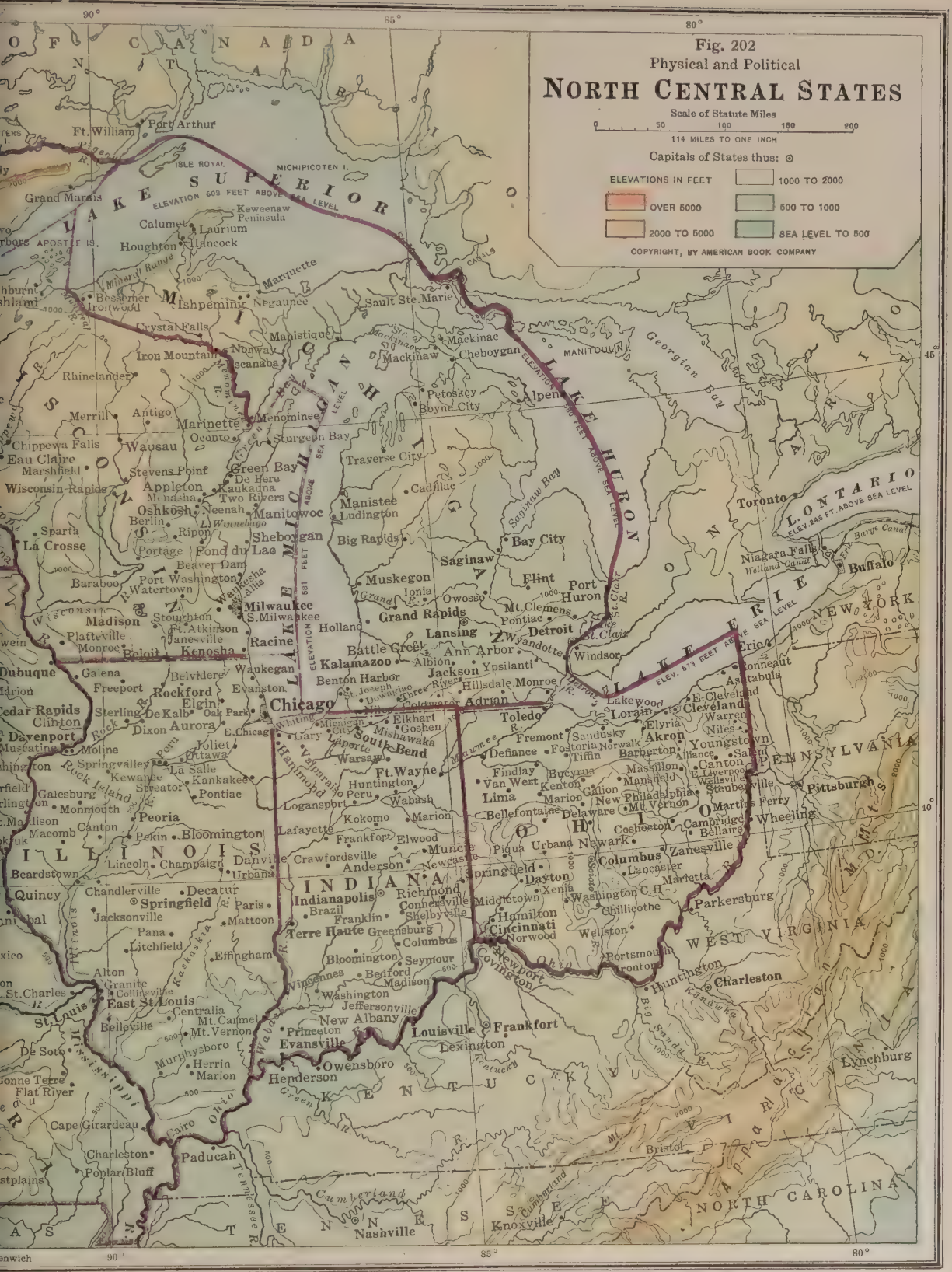


Fig. 202
Physical and Political
NORTH CENTRAL STATES
Scale of Statute Miles
0 50 100 150 200
114 MILES TO ONE INCH
Capitals of States thus: ⊙
ELEVATIONS IN FEET
OVER 5000
2000 TO 5000
1000 TO 2000
500 TO 1000
SEA LEVEL TO 500
COPYRIGHT, BY AMERICAN BOOK COMPANY
LAKE SUPERIOR
LAKE MICHIGAN
LAKE HURON
LAKE ERIE
LAKE ONTARIO
ILLINOIS
INDIANA
OHIO
WISCONSIN
MICHIGAN
MINNESOTA
IOWA
MISSOURI
KENTUCKY
WEST VIRGINIA
PENNSYLVANIA
NEW YORK
Chicago
Milwaukee
Detroit
Cleveland
Toledo
Buffalo
Pittsburgh
Columbus
Indianapolis
Cincinnati
Louisville
Frankfort
Nashville
Knoxville
Charleston
Parkersburg
Huntington
Toronto
Niagara Falls
Erie
Lake Michigan
Lake Superior
Lake Huron
Lake Erie
Lake Ontario
Ohio R.
Mississippi R.
Missouri R.
Kentucky R.
Tennessee R.
Cumberland R.
Allegheny R.
Monongahela R.
Kanawha R.
Wabash R.
Illinois R.
Rock Island
Green Bay
Madison
Minneapolis
St. Paul
Duluth
Des Moines
Omaha
Kansas City
St. Louis
Cincinnati
Columbus
Dayton
Springfield
Akron
Youngstown
Canton
Wheeling
Zanesville
Lexington
Bristol
Lynchburg
Norfolk
Richmond
Charleston
Huntington
Parkersburg
Pittsburgh
Erie
Buffalo
Toronto
Niagara Falls
Georgian Bay
Manitoulin I.
Isle Royal
Michipicoten I.
Apostle Is.
Sault Ste. Marie
Mackinac
Cheboygan
Petoskey
Alpena
Traverse City
Saginaw Bay
Bay City
Saginaw
Flint
Port Huron
Detroit
Windsor
St. Clair
Lake St. Clair
Mt. Clemens
Pontiac
Grand Rapids
Muskegon
Ludington
Manistee
Cadillac
Big Rapids
Lansing
Ann Arbor
Jackson
Kalamazoo
Battle Creek
Benton Harbor
St. Joseph
Niles
Michigan City
Gary
Chicago
Waukegan
Evanston
Oak Park
Aurora
Joliet
Ottawa
La Salle
Peru
Rock Island
Moline
Davenport
Dubuque
Galena
Freeport
Rockford
Elgin
Dixon
Sterling
De Kalb
Clinton
Cedar Rapids
Iowa City
Muscatine
Burlington
Keokuk
Fort Madison
Quincy
Hannibal
Springfield
Decatur
Jacksonville
Beardstown
Pekin
Peoria
Bloomington
Champaign
Urbana
Danville
Lafayette
Terre Haute
Evansville
New Albany
Jeffersonville
Indianapolis
Richmond
Connersville
Shelbyville
Franklin
Greensburg
Columbus
Seymour
Bedford
Madison
Vincennes
Washington
Princeton
Mt. Vernon
Mt. Carmel
Centralia
East St. Louis
Belleville
Alton
Granite City
Collinsville
Litchfield
Pana
Effingham
Mattoon
Paris
Springfield
Jacksonville
Beloit
Janesville
Madison
Milwaukee
Racine
Kenosha
Waukesha
Watertown
Fort Atkinson
Platteville
Monroe
Stoughton
Sheboygan
Fond du Lac
Oshkosh
Neenah
Menasha
Appleton
Kaukauna
Green Bay
De Pere
Two Rivers
Manitowoc
Berlin
Ripon
Portage
Beaver Dam
Port Washington
Baraboo
La Crosse
Sparta
Wisconsin Rapids
Stevens Point
Wausau
Merrill
Antigo
Chippewa Falls
Eau Claire
Marshfield
Rhinelander
Iron Mountain
Escanaba
Menominee
Marinette
Oconto
Sturgeon Bay
Manistique
Crystal Falls
Ironwood
Bessemer
Negaunee
Ishpeming
Marquette
Calumet
Laurium
Houghton
Hancock
Keweenaw Peninsula
Grand Marais
Port Arthur
Ft. William
Duluth
Minneapolis
St. Paul
Rochester
Mankato
Austin
Albert Lea
Fairmont
Winona
La Crosse
Red Wing
Hastings
Faribault
Northfield
Owatonna
Waseca
New Ulm
Mankato
Worthington
Jackson
Fulda
Luverne
Pipestone
Sioux Falls
Yankton
Vermillion
Elk Point
Sioux City
Council Bluffs
Omaha
Fremont
Norfolk
Grand Island
Hastings
Kearney
Lincoln
Nebraska City
Falls City
Beatrice
York
Seward
Columbus
Fairbury
Hebron
Superior
Hastings
Red Cloud
Franklin
Bloomington
Minden
Holdrege
Oxford
Cambridge
McCook
Trenton
Culbertson
Indianola
Benkelman
Imperial
Chase
Wauneta
Grant
Ogallala
Sidney
Kimball
Potter
Chappell
Big Spring
Julesburg
Sterling
Akron
Wray
Yuma
Holyoke
Haigler
Benkelman
Arapahoe
Cambridge
McCook
Trenton
Culbertson
Indianola
Benkelman
Imperial
Chase
Wauneta
Grant
Ogallala
Sidney
Kimball
Potter
Chappell
Big Spring
Julesburg
Sterling
Akron
Wray
Yuma
Holyoke
Haigler

Fig. 203. Mississippi River at Davenport, Iowa, separating Illinois from Iowa

THE NORTH CENTRAL STATES

	Area, Sq. Mi.	Population, 1920	Capital
Ohio	41,040	5,759,394	Columbus
Indiana	36,354	2,930,390	Indianapolis
Illinois	56,665	6,485,280	Springfield
Michigan	57,980	3,668,412	Lansing
Wisconsin	56,066	2,632,067	Madison
Minnesota	84,682	2,387,125	St. Paul
Iowa	56,147	2,404,021	Des Moines
Missouri	69,420	3,404,055	Jefferson City
North Dakota	70,837	646,872	Bismarck
South Dakota	77,615	636,547	Pierre
Nebraska	77,520	1,296,372	Lincoln
Kansas	82,158	1,769,257	Topeka

Map Study.—1. What states lie along the Mississippi River on the east? On the west? 2. What states are bordered or crossed by the Missouri River? 3. What states lie on the north bank of the Ohio River? 4. What states have a direct outlet for their goods by way of the Great Lakes? 5. Which state has the longest shore line on the Great Lakes? 6. In what way does northern or southern Michigan resemble Florida?

7. Make a sketch map showing the outlines of all the states in the group, with the courses of the three chief rivers and the outlines of the Great Lakes. 8. On this map locate, on these rivers and lakes, Cleveland, Detroit, Duluth, Milwaukee, Chicago, St. Paul, Minneapolis, St. Louis, Kansas City, Omaha, and Cincinnati.

9. What branch of the Missouri River crosses Nebraska? 10. What large river crosses southern Kansas? 11. What large river flows out of this region into Canada? 12. What states are bordered by this stream? 13. What three state capitals are on the Missouri River?

14. What river rises near Chicago and flows into the Mississippi River? 15. What river leads from central Wisconsin into the Mississippi River? 16. What large bay opens into Lake Michigan? 17. Follow the stream that enters this bay to a point near Portage, on the Wisconsin River, and give a reason for the name of this city.

18. What bay belongs to Lake Huron? 19. What natural boundaries are found between Minnesota and Canada? 20. If a boat goes down the river from Fargo, what city of Canada will it reach (Fig. 46)?

21. What states of this group can be reached by sailing up some stream belonging to the Mississippi River system?

PHYSICAL FEATURES

176. Location and Drainage.—The North Central region includes twelve states. Five of them are east of the Mississippi River and north of the Ohio. They are Ohio, Indiana, Illinois, Michigan, and Wisconsin. They are sometimes called the "Old Northwest." West of Lake Superior and the Mississippi River are the other seven states of the group; namely, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas. The three first named lie along the Mississippi, and all but Minnesota are either bordered or crossed by the Missouri River.

Most of the region, therefore, is included in the basin drained by the upper Mississippi River, together with its two great tributaries, the Ohio and the Missouri. Six of the states lie partly along the Great Lakes, in the drainage basin of the St. Lawrence River system. Five of these, however, send the greater part of their waters into the Mississippi system, but the state of Michigan drains almost entirely into the Great Lakes. North Dakota and Minnesota drain in part into Canada through the Red River of the North. Thus the waters of the North Central region reach the Atlantic Ocean through the Gulf of Mexico, the Gulf of St. Lawrence, and Hudson Bay.

Fig. 204. In the lake region of Wisconsin

177. Central Lowlands.—A large part of the plains in the North Central group are prairies. The first white men to visit the prairie region found few trees except along the streams, on the flood plains and bordering bluffs. The prairies are usually free from stones, and are covered with a black, rich soil which is in places ten feet in depth. In some parts of the East it was almost the work of a lifetime to clear away the trees and bowlders, and subdue a farm. But on the prairies a team could break up the matted roots of the prairie plants, and large crops soon rewarded the pioneer farmer.

At first the land could be purchased from the government for $2 an acre, later for $1.25 an acre, and still later the government gave land to settlers if they would make a home on it and cultivate it for five years. As a result most farms were larger than those in the East. They often consisted of a quarter section; that is, of one fourth of a square mile, or 160 acres. A single farm might contain a half section, or even a whole section. As the land was nearly level, or only gently rolling, large fields could be laid out, and when modern plows, grain drills, and reapers were invented, they could be used to advantage on the smooth, broad fields. The larger part of the lowlands of Ohio and Indiana were originally covered with forest. These woodlands have been cleared and converted into highly productive farms. The central lowlands, both prairie and forest areas, have become the chief farming region of the United States. Here are raised the greatest crops of wheat, corn, and oats, and the largest numbers of live stock.

178. Uplands.—In southern Ohio and southern Indiana are uplands varying from about 1000 feet in altitude in parts of Ohio to a few hundred feet in Indiana. These upland surfaces descend on the west and north to the central lowlands. In the hilly counties of Indiana and Ohio there are still considerable areas of forest.

There are also upland areas in northern Michigan and in northern and southwestern Wisconsin. The highest elevation in Wisconsin is nearly 2000 feet above the sea, and northern Michigan has points that rise above 2000 feet. The uplands of both these states were originally covered with forest and are still important producers of lumber. The same hilly upland extends into central and northern Minnesota. This region is covered by glacial drift, is dotted with thousands of lakes (Fig. 204), and bears extensive forests.

Much of the southern half of Missouri, or the part that lies south of the Missouri River, belongs to the Ozark Plateau. Its surface is from 800 to 1800 feet above the sea, and it is largely a region of forests and mines, quite unlike the prairies that extend over and beyond the northern half of the state.

179. Great Plains.—The eastern parts of North and South Dakota, of Nebraska, and of Kansas have more than 20 inches of rainfall annually (Fig. 72), and therefore bear abundant grasses and other crops without irrigation or special methods of farming. The western parts of these states, in the Great Plains (Sec. 51), are higher and drier, having less than 20 inches of rainfall. The natural grasses there are not so thick and luxuriant as those of the prairie; but profitable crops are grown with the aid of irrigation or by means of dry farming. These ways of farming are described (Secs. 227–233) in connection with the Plateau States, where they are more extensively used than in this group of states. Many farmers on the plains protect their homes and fields from the strong winds by planting trees, thus forming windbreaks (Fig. 66).

Fig. 205. The Homestake gold mine, Lead, South Dakota

The prairies and the Great Plains form a continuous, rather even surface, with a gradual increase of elevation from the Mississippi River to the foot of the Rocky Mountains. There is no abrupt passage from prairies to the high plains, but there is a gradual thinning of the vegetation.

In parts of western South Dakota and North Dakota, and of eastern Montana, the heavy rains, which sometimes come even in dry regions, have washed away much of the soil, leaving hills and gorges with sides and walls partly of bare rock. These regions, called Bad Lands, bear no crops, although some of them afford pasture; they are so rough that it is difficult to travel through them.

In the western part of South Dakota rise the Black Hills. They are really a group of rugged mountains. Part of the region is covered with a forest, which has been made a forest reserve by the government of the United States. Gold and other minerals are mined here (Fig. 205).

180. Glacial Deposits.—While the prairies are plains, it must not be thought that they are everywhere quite flat. They are uneven, partly by reason of the valleys which the rivers and smaller streams have cut below the general surface. They are uneven also because the glacial ice (Sec. 32) left its deposits of waste irregularly.

The ice sheet covered most of the prairie regions and left the surface in some places gently rolling. In other places it deposited waste in the form of hills or moraines. Some of these moraines are several miles wide and extend for long distances. Yet to one who lives in a hilly or mountainous country the surface of the prairie would seem almost level.

Many parts of the prairies were swept by streams of water that flowed from the melting ice in the glacial time. These streams deposited fine mud and sand over the regions which they flooded.

We can now see the reasons why prairie soils are so fertile. The prairies have a deep cover of wasted and pulverized rock, and upon it for several thousand years, following the ice invasion, plants grew and the decaying roots and tops mingled with the rock waste, until a deep, black soil was formed, full of plant food.

181. Climate.—The climate of the North Central region is continental (Sec. 27); that is, the land is far from the sea, and has hot summers and cold winters. The rainfall ranges from 50 inches in the southeast, to less than 20 inches in the west (Sec. 60). The region is swept by the prevailing westerly winds, and is in the track of the cyclonic storms (Sec. 62). It is the south and southeast winds of the cyclonic storms that bring moisture from the Gulf of Mexico and the Atlantic Ocean.

The average period between killing frosts, that is, the crop-growing period, is 200 days in the extreme south of Illinois and Missouri, on the lowland along the Ohio and Mississippi rivers. It is 110 days in the northern parts of Minnesota and North Dakota. In the heart of the prairie country it varies from 140 to 170 days, allowing ample time to mature the chief crops of temperate latitudes (Fig. 71). It must be remembered, also, that the summer days are longer in the north than in the south; so that the 110 crop-growing days in northern Minnesota have more daylight hours, in which crops can grow, than 120 days in southern Illinois.

The water of the Great Lakes is warmed during the summer and accumulates heat. As water does not cool so quickly as land, the autumn winds are warmed in passing across the lakes, and the temperature of the land along their shores is moderated. As a result the growing season is longer near the lakes than in adjoining but less favorably located regions in the same latitude.

In general, therefore, the North Central States have warm summers for the growth of crops, and winters that are cold but clear, and hence are bracing and favorable to health and activity. The soils are rich, many of the rivers and lakes are navigable, and the plains are level so that railroads have been easily constructed (Fig. 206). These facts explain the rapid increase of population and the growth of many cities.

Review.—1. Which of the North Central States are bordered by the Ohio River? By the Mississippi River? By the Missouri River? 2. What states are crossed by the Missouri River? 3. Which states are bordered by the Red River of the North? 4. Which states have a frontage on Lake Superior? On Lake Michigan? On Lake Erie?

5. What conditions are favorable to farming on the prairies? 6. What parts of the North Central region are uplands? 7. What name is given to the upland of Missouri? 8. What are the Bad Lands? 9. What states consist almost entirely of prairie? 10. Explain the origin of the rich soil of the prairies.

11. Describe the summers and winters of this region. 12. What facts can you give concerning the length of the growing season in these states? 13. What effect have the Great Lakes upon the climate of adjacent lands?

14. Point out resemblances in surface and rainfall among the four states: Kansas, Nebraska, South Dakota, and North Dakota.

Fig. 206. Railroad yards at St. Paul

WHEAT, CORN, AND OTHER CROPS

182. Use of Wheat.—In most parts of our country, bread is made chiefly of wheat flour. This is true also in Canada, Great Britain, and France, and much wheat is used in Germany, Italy, Spain, and many other lands in the temperate zones. But the United States uses more wheat than any other country — about 600,000,000 bushels a year.

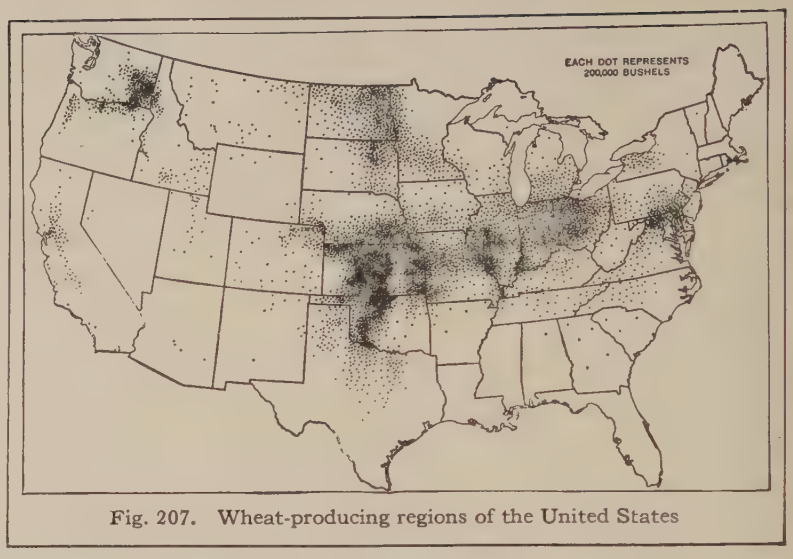


Fig. 207. Wheat-producing regions of the United States

183. Where Wheat is Raised.—Wheat is raised in North America, from the highlands of Central America and Mexico to the basin of the Mackenzie River, at about 60° north latitude. In the far south it can be grown because the highlands are cool (Sec. 26). In the far north spring wheat can be raised, as it grows and ripens in a short time because of the very long summer days. The great wheat belt of North America is in northern United States and southern Canada.

Far more wheat is produced in Europe than in any other continent. It is raised also in north Africa, in Asia, in Australia, and in Argentina. Wheat-raising extends around the world, mainly in the two belts of temperate climate.

The wheat-growing regions of the United States are shown in Fig. 207. From this chart the student should make a list of twenty or more states where the wheat crop is important. The greatest wheat region in the country is west of the Mississippi River, and includes Minnesota, the Dakotas, Kansas, Nebraska, and Missouri. In this region the soil and climate are especially well suited to the growth of wheat. Other states with large wheat crops are Ohio, Indiana, Illinois, and Washington.

Fig. 208. Cultivation of soil by motor-drawn disc and harrow

184. Raising and Harvesting Wheat.—In Minnesota and the Dakotas the seed is sown in the spring. Farther south, as in Kansas, Missouri, or Ohio, winter wheat is raised. It is sown in early autumn, makes a small growth before winter, and matures the following summer.

In the early days wheat was sown by hand, reaped with a sickle, and threshed by hand. By these simple means wheat bread could be produced only for the few. Now gang plows,

discs, and harrows (Fig. 208), drawn by teams or powerful engines, turn over the soil. When it is seeding time wide grain drills may be at work in a single field. The ripe wheat is cut and bound by harvesting machines (Fig. 209), and afterward the grain is separated from the straw by threshing machines (Fig. 67). Through the invention of machinery, the cultivation of the great wheat lands, and the building of railroads and ships, it is possible for hundreds of millions of people to have bread at a moderate price.

Fig. 209. Reaper and binder, Nebraska

185. Wheat Markets.—After the wheat is raised it must be taken to market. Many railroads have been built to bring the wheat from the prairie fields. The farmer hauls it to the railroad station. If it does not go at once into a freight car, it is hoisted into a grain elevator, where it is stored until needed. When it is to be shipped the grain is loaded into freight cars through chutes. The railroad takes it to some milling center such as Minneapolis, or to a Great Lake port such as Chicago, Superior, or Duluth in the United States, or Fort William or Port Arthur in Canada. In such places are elevators (Fig. 210) that hold millions of bushels of wheat awaiting shipment down the lakes, and, it may be, across the ocean.

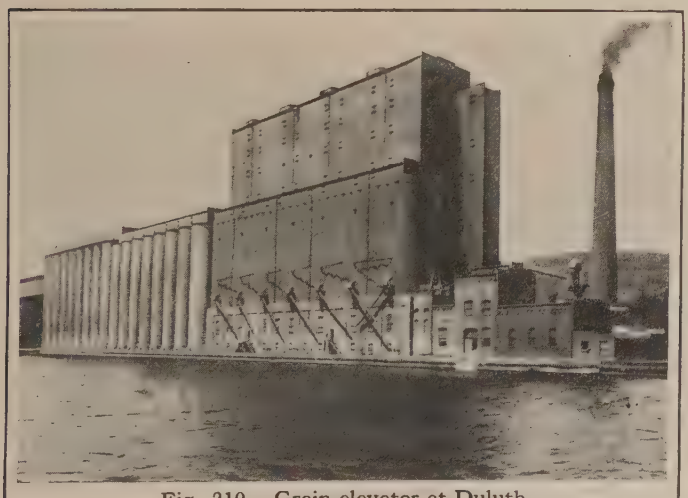


Fig. 210. Grain elevator at Duluth

186. Flour Mills.—Much wheat is taken to Minneapolis, the largest wheat-milling center in the United States. The city is on the Mississippi River by the Falls of St. Anthony, in a vast wheat region; and trains on many railroads bring in the crop. Large Minneapolis mills make many thousands of barrels of flour in a day. Barrels and sacks are needed, in which to pack the flour, and hence people are kept busy in the lumber and paper mills. The railroads that handle the crop and the manufactured flour must have steel for rails and engines, wood for ties, and both iron and wood for freight cars, stations, and elevators. Thus the people of the farm, the forest, the mine, the mill, and the railroad all help to supply the loaf of wheat bread,—and we do not really get the loaf until the wholesale and retail dealers in flour and the baker have done their parts.

187. Corn.—Corn is also known as maize and is often called Indian corn, because the Indians raised it. It is a native of the Western Hemisphere, but was introduced into Europe soon after the discovery of America. Although it is now raised in many parts of the

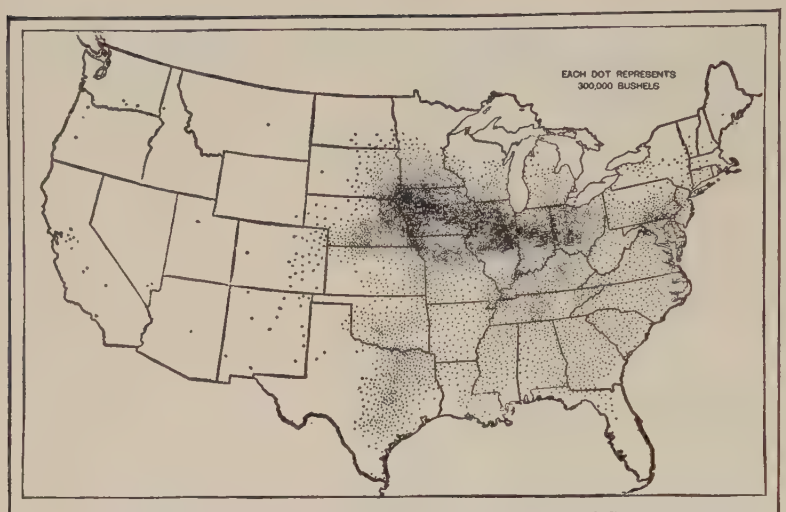


Fig. 211. Corn-producing regions of the United States

world that have a suitable climate, the crop in the United States is far larger than the crops of all other countries together. Corn thrives best in a warm-temperate climate, with abundant sunlight. In comparison with wheat it grows better farther southward. Thus, more wheat than corn is raised in Canada; but much more corn than wheat is raised in the southern states. The *corn belt* extends from Ohio, through Indiana, Illinois, Iowa, and Missouri, to central Kansas and Nebraska (Fig. 211). Here nearly every farmer cultivates a field of corn. Some of it is cut for the silo (Sec. 110) before it is entirely ripe, but most of it is allowed to ripen, so that the matured grain may be fed to stock or taken to market.

About 800,000,000 bushels of wheat are raised each year in this country, and about 3,000,000,000 bushels of corn, or nearly four times the amount of wheat produced. The number of bushels of corn raised in the United States is about three fourths the number of bushels of wheat raised in all the countries of the world.

Some of the corn is hulled and broken for hominy. Corn is also ground for cornmeal and is used for making cornstarch and breakfast foods. The making of breakfast and health foods, from corn, wheat, and oats, is one of the chief industries of Battle Creek, Michigan. Corn is consumed also in making sirup, oil, and other corn products. The greater part of the corn, however, is fed to hogs and cattle. This is the reason why the corn belt is also the chief live-stock region in the United States. As the price of meat is very high, it generally pays better to use the corn to fatten hogs and cattle than it does to ship the grain to a distant market.

188. **Cereals.**—Wheat and corn are familiar sights in the fields and on the farms of the North Central States. In the Red River Valley of Minnesota and North Dakota the land is almost as flat as a floor, and the wheat, waving in the wind just before the harvest, is like a yellow sea as far as the eye can reach. The corn of Indiana, Illinois, or Iowa presents a different appearance, the thick green stalks tasseling out at a height of eight or ten feet (Fig. 212). Forty or eighty acres of corn look more like a young forest than like a field of grain. Where the

Kansas State Agricultural College

Fig. 212. Cutting corn in Kansas

U. S. Department of Agriculture

Fig. 213. Harvesting flax in Michigan

Fig. 214. Kafir corn

summers are somewhat cooler, as in Minnesota or Canada, the stalks are usually shorter and more slender, and the yield is not so great.

Wheat and corn are by no means the only cereal crops raised on the farms of this region. Three fourths of the oats raised in the United States are produced in this group of states. Illinois and Iowa, which have the largest proportion of prairie land, are the leaders in raising this grain. Most of the oats are fed to horses and poultry, but some are used for the food of man. At Cedar Rapids, Iowa, for example, there are large oatmeal factories. More than half of the barley crop of the country is raised in the northern states of this region, namely, Minnesota, North Dakota, South Dakota, Wisconsin, and Iowa. Barley will grow even farther north than wheat, but it also thrives in warm climates, as in California and southern Europe. Considerable rye is raised, especially in Wisconsin, Michigan, and Minnesota.

189. Other Crops.—Much flax (Fig. 213) is grown in North Dakota, South Dakota, and Minnesota, not for its fiber, but for the seed, which is used for making linseed oil. After the oil, which is mainly used in mixing paint, has been pressed out, the cake that remains is a valuable food for stock. Most of the flax fiber used for making linen is raised in Europe. Hay is a very important crop of the North Central States. Besides hay, the forage plants include alfalfa, corn, sorghum, and Kafir corn (Fig. 214), a forage plant that does well in dry regions.

Other leading products are: potatoes, of which many are raised in all the North Central States; beans, and sugar beets. Kalamazoo, Michigan, is the shipping center of one of the districts where fine celery is grown. Michigan and Wisconsin raise more sugar beets than any other states east of the Mississippi River, and have a number of factories for making the sugar. Tobacco is raised in Ohio and in Wisconsin (Fig. 162).

The North Central States produce much fruit. Many grapes are grown in southern Michigan, near Lake Michigan; and in northern Ohio, near Lake Erie. Apples, peaches, and other orchard fruits are grown in abundance in these two states and also in Missouri, Illinois, Kansas, and other states.

Review.—1. How far to the north and south is wheat raised in North America? 2. What is now the greatest region for wheat in the United States? 3. What inventions make it possible to raise much wheat at the present time? 4. Why is Minneapolis a large center for making flour?

5. By what other name is corn known? 6. In what parts of the world is it grown? 7. What kind of climate is favorable to it? 8. What states are in the corn belt? 9. For what is corn used?

10. What is the importance of the oat crop in the North Central States? 11. Which of these states raise the most barley? 12. For what purpose is most American flax raised? 13. What states are the main producers of flax? 14. What states of this group lead in raising sugar beets?

Fig. 215. Hogs. In the background is a corn crib. The ground is littered with corn husks

A farmer owning 160 acres (a quarter section), or 320 acres (a half section), in one of the North Central States, may plant a quarter or a third of his farm in corn, and have also some fields of oats, of grass and clover, and perhaps of wheat, besides pastures. The corn will fatten the cattle and hogs, and if the farmer keeps a dairy, the hogs will be fed partly with the skim milk, buttermilk, and whey left after making the butter and cheese. Many farmers in the prairie states get their money mainly from the sale of the cattle and hogs, and from milk, butter, cheese, and poultry. Iowa, Missouri, Illinois, and Ohio are the leading states in the poultry industry of our country. Near the great cities, such as Chicago, St. Louis, Cleveland, Cincinnati, Minneapolis, and many others, truck farming and dairying take the place of general farming. Land has become very valuable in the prairie states, and the farmer who has a good quarter or half section paid for, equipped with proper buildings and tools, and well stocked with farm animals, is a prosperous, and in many cases a wealthy, man.

STOCK RAISING AND MEAT PACKING

190. Live Stock on Farms.—In the North Central States many domestic animals are raised on farms and on ranches. The farms are numerous in all the states of the group. The ranches are in the drier districts of the western states. On a great many farms both crops and stock are raised, because the animals require the corn, oats, and hay that are produced by the fields. The farmer finds it profitable to feed his corn and hay to his stock and in this way turn them into beef, butter and cheese, pork, mutton, and wool; and in general the states that raise the most corn, raise the most cattle and hogs (Figs. 215–218). In Iowa, Illinois, and Missouri, large numbers of hogs and cattle are fattened for the market. Wisconsin, Iowa, and Minnesota, with New York, lead in the number of dairy cows. Texas, however, is first in beef cattle (Figs. 217, 218). This is not only because Texas raises much corn, but especially because it has thousands of square miles of wild grasses for pasture.

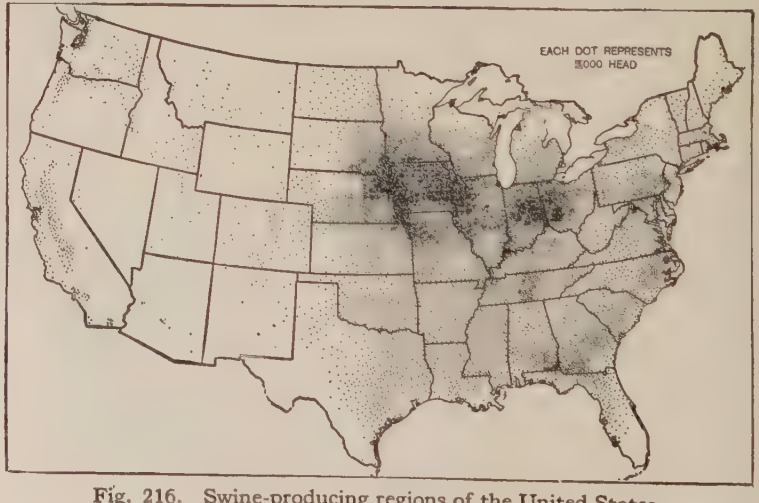


Fig. 216. Swine-producing regions of the United States

191. Sheep.—Many sheep are raised in the North Central States, especially in Ohio, Michigan, and Missouri. This industry, however, is studied under the Plateau States, which raise a far greater number.

192. Cattle.—Ranches and cattle ranges are found in parts of Kansas, Nebraska, and the Dakotas. Many cattle also are pastured on the plains of Oklahoma and Texas, and many on the open lands of Montana, Wyoming, Colorado, New Mexico, and of the states farther west (Fig. 217). In all these regions rains are light (Sec. 60), and the native bunch grass, though highly nutritious, is thin. One or two acres of corn or grass land will keep a beef animal in Iowa, but fifteen or twenty acres are necessary on the dry plains.

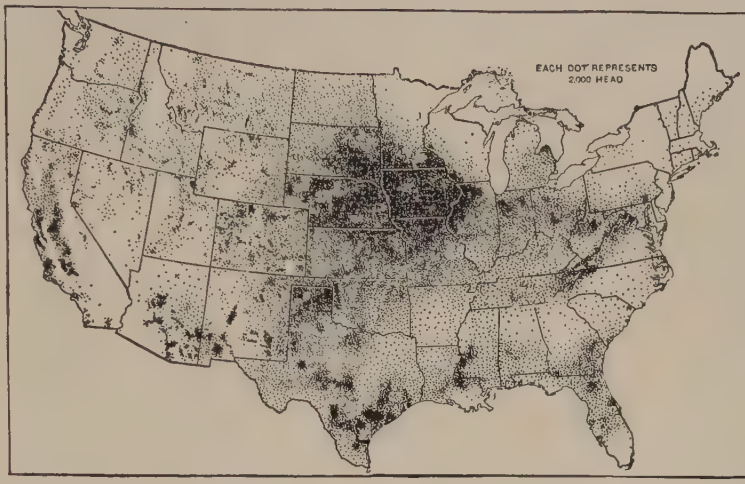


Fig. 217. Distribution of beef cattle in the United States

The grass, which grows green and fresh in the time of the spring rains, is dried up and cured like hay by the summer sun. In former times, therefore, the cattle were left on the open plains the year round, winter as well as summer. Better methods are now in use, and the cattle are sheltered and fed during the winter. Their increase in value more than pays for the cost of the shelter and extra labor.

As the land in the western states is being taken up for dry farming, the cattle ranches are decreasing in number and size.

Some cattle need to be "finished off" with corn feeding before they will bring the best price in the market. Thousands of cattle are sent from the ranches to the farmers of the prairie states farther east, who feed them with corn, and finally send them to the packing houses of some neighboring city (Sec. 195). Many hogs and beef cattle are shipped alive, or "on the hoof," to eastern cities and slaughtered there. Trainloads of cattle and hogs moving eastward are common sights on several of the railroads of the North Central States.

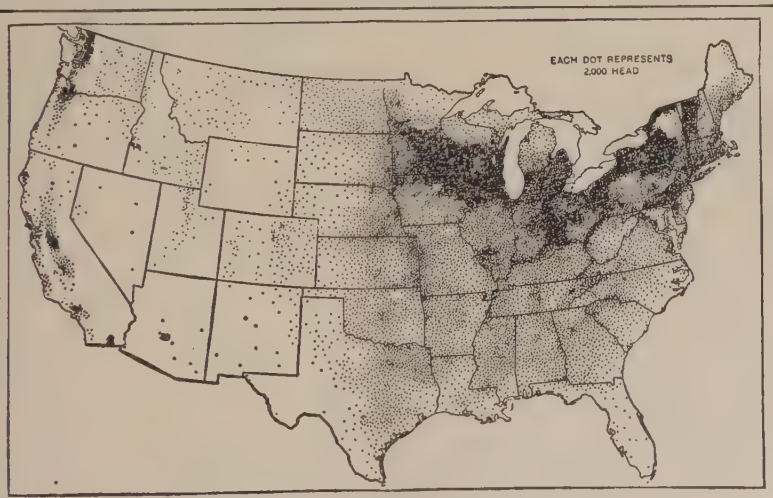


Fig. 218. Distribution of dairy cows in the United States

193. Ranchmen. — Unfenced ranges are now less extensive in the West. Much of the pasture land is in large fenced ranches. The ranchman's house usually is placed by a stream or spring, and near it are a corral, a barn, a garage, a blacksmith shop, and a pasture for horses. The helpers may still, as of old, be

called cowboys, but their work is different from that in former years. Instead of herding the cattle and watching for cattle thieves, they help the ranch owner in keeping the fences, watering the cattle, and cutting hay, in the more northern states where winter shelter is necessary. A single ranch may include hundreds of acres or even many square miles.

194. The Round-up.—Twice each year on the unfenced ranges there is a round-up. The cowboys of various ranches gather and spread out in lines or parties and drive in or round up the cattle for a number of miles. Day after day they take a different section of the country. When the cattle have been rounded up they are found to belong to many different owners. Each grown animal bears its owner's brand, and as the young calves will usually follow their mothers, it is easy to pick them out also. The calves that do not follow their mothers are divided among the owners according to the number of cattle each one owns. Each calf is branded by a hot iron with its owner's mark. In the autumn round-up the animals that are ready to be marketed, or to be shipped to the prairies for "finishing off," are separated from the herd by the cowboys, and the rest of the herd are allowed to wander back on the range.

195. Meat Packing.—In former times the people of a city were supplied with meat by farmers near at hand, who drove in their cattle, sheep, or hogs and sold them to the local butcher. To-day, beef and pork enough to supply Paris, London, New York, or Philadelphia cannot be raised near these cities. They must often be brought from a great distance. Modern trains and ships make this possible. Some animals are shipped alive, but the greater number are slaughtered in cities that are not far from the stock farms and ranges.

Such cities are known as packing centers. Chicago is the greatest of these. It is not only in the midst of the prairie stock farms, but is easily reached by railroads from the stock ranges west and southwest. Still nearer the ranges are the packing houses of Omaha in Nebraska, Kansas City and Wichita in Kansas, Sioux City in Iowa, St. Joseph and St. Louis in Missouri, and East St. Louis in Illinois. The five leading cities in the meat-packing industry are Chicago, Kansas City, Omaha, New York, and Indianapolis, the capital of Indiana.

The stockyards in Chicago (Fig. 225) receive the animals as they come from the trains. Thousands of cattle and hogs and sheep are killed every day, and the families of those who work in the packing houses would people a good-sized city. Much of the meat is sent in quarters or whole carcasses, by refrigerator cars (Fig. 219), to cities and towns in all parts of the country. The local depots of the great meat packers are seen in every city. Some of the meat goes abroad in cold storage. Some is salted, smoked, or sealed in air-tight cans, and is thus prepared for keeping and for sending to all parts of the world.

Fig. 219. Loading meat on a refrigerator car at Chicago

196. By-products.—The meat furnishes only part of the profit from the slaughtered animals.

The hair and bristles are used in upholstery, in making brushes, and for other purposes. The hides are tanned for leather, and the blood and other refuse make valuable fertilizers. The horns and bones are turned into buttons, hairpins, combs, brushbacks, and handles of many kinds. Other parts serve for making glue, soap, glycerin, poultry food, gelatin, and for various medical preparations. Nothing is wasted.

Fig. 220. Iron mining in an open pit, Minnesota. The steam shovel is dumping a shovelful of ore into a car

Review.—1. Where are the livestock ranches mainly found? 2. Which are the leading states in this group in dairy interests? 3. Where are many sheep raised? 4. To what kinds of animals is corn chiefly fed? 5. From what products of this region do many farmers get most of their money? 6. How much land in the ranch country may be necessary for a single head of cattle?

7. What is the chief city for meat packing? 8. What other cities are important in this industry? 9. What conditions favor the industry at these places? 10. By what means are meats preserved? 11. What are some of the by-products of meat packing?

MINING AND LUMBERING

197. Useful Minerals.—The North Central States are well provided with useful minerals. Most of these states have coal beds. Minnesota, Wisconsin, Michigan, Ohio, and Missouri have deposits of iron, and the three states bordering on Lake Superior produce enormous quantities of the ore. Copper is found in northern Michigan, and lead and zinc in Missouri, Kansas, and Wisconsin. Petroleum and natural gas, building stones, and useful clays are found in many states of the group.

Fig. 221. Ore vessel on the Great Lakes

198. Iron.—Minnesota produces more iron ore than any other state. Most of the iron ore used in the Pittsburgh district (Sec. 127) comes from the three states of the Lake Superior region. Much of it is an earthy ore that is easily dug in open pits. Trains of ore cars are run into these broad pits, and the cars are filled by steam shovels (Fig. 220). When filled, the ore cars go to Duluth, Superior, Two Harbors, Ashland, or Marquette on the shores of Lake Superior, or to Escanaba on the shore of Lake Michigan. They are run out on long piers, and the ore is dumped into great pockets and from these into the holds of ore vessels, to be taken down the lakes (Fig. 221). The ore is unloaded at Cleveland, Ashtabula, Conneaut, Buffalo, Erie, Lorain, Toledo, or some other port of Lake Erie, or at Chicago or Gary on

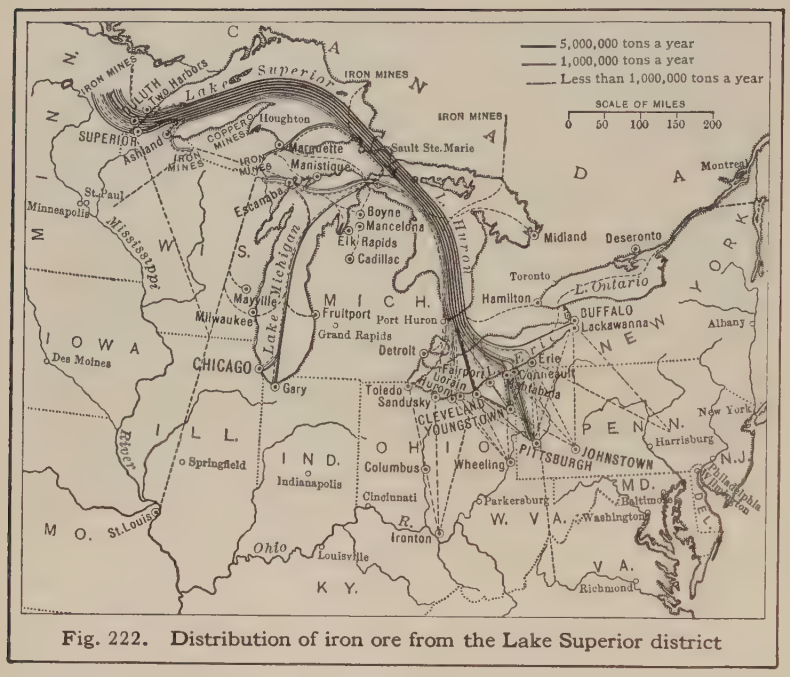


Fig. 222. Distribution of iron ore from the Lake Superior district

Lake Michigan (Fig. 222). Some of it is smelted in these cities, and much goes to Pittsburgh. Thus in most cases the iron ore is brought near the coal beds, or near large markets. But the big freight steamers that bring iron ore from Lake Superior to the lower lake ports do not have enough freight to carry on the return trip. Therefore, they can afford to carry coal very cheaply. A steel plant recently built at Superior, Wisconsin, uses as fuel coal brought from the lower lakes in this way.

In the North Central group the manufacture of iron and steel, and of iron and steel castings and machinery, is not only important in the cities already mentioned, but also in many others. It is, for example, the chief industry of Youngstown, Canton, and Steubenville in Ohio; and of Joliet in Illinois.

199. **Coal.**—While most of the states in this group have coal (Fig. 127), the most important beds are found in Ohio, Indiana, Illinois, Iowa, and Kansas. About two thirds of the surface of the state of Illinois is underlain by coal beds. Manufactures are already important in many of these states, and with so much coal to supply power, they may become as well known for manufacturing as for farming.

200. **Copper.**—Michigan stands with Arizona, Montana, and Utah as one of the four leading states of our country in the production of copper. The Michigan copper is found on the Keweenaw Peninsula (Fig. 202), and has been longest known, for pieces of the metal were broken from exposed ledges of rocks and carried southward by the glacier. The Indians sometimes picked them up and hammered them into implements. Now the copper ore, consisting of small particles of metal scattered through the rock, is found far below the surface. The Calumet and Hecla mine, with the depth of about a mile, is one of the greatest as well as deepest of mines.

The United States produces more than half of the world's supply of copper. This metal is much used for making wire, because copper wire is a good conductor of electricity, and is needed for trolley and telephone wires and electric lighting. Copper is also the chief metal in the alloys known as brass and bronze. Much copper is exported to other countries.

201. **Petroleum and Natural Gas.**—Petroleum and natural gas (Secs. 113, 114) are found in Illinois, Ohio, Kansas, and Indiana. Illinois is the largest producer of petroleum in this group of states, and outranks all other states east of the Mississippi River.

202. **Cement.**—The lime and clay needed in the manufacture of cement (Sec. 117) are found in many places in the North Central States. There are large cement factories

in Michigan, Ohio, Indiana, Illinois, Iowa, Missouri, and Kansas. The limestone quarries along the Mississippi River in Missouri and Illinois make the district around Hannibal, Missouri, and Quincy, Illinois, one of the largest cement-producing fields of the country.

203. Other Products.—Joplin, in the southwestern part of Missouri, is an important center for the mining of lead and zinc; Missouri ranks first among the states in the production of these two metals. Gold is mined in the Black Hills in South Dakota (Fig. 205), and Michigan produces more salt than any other state in the country. East Liverpool, Ohio, is one of the chief places in the United States for the making of pottery and porcelain (Fig. 223), and Zanesville, Ohio, is noted for its manufacture of decorative tile.

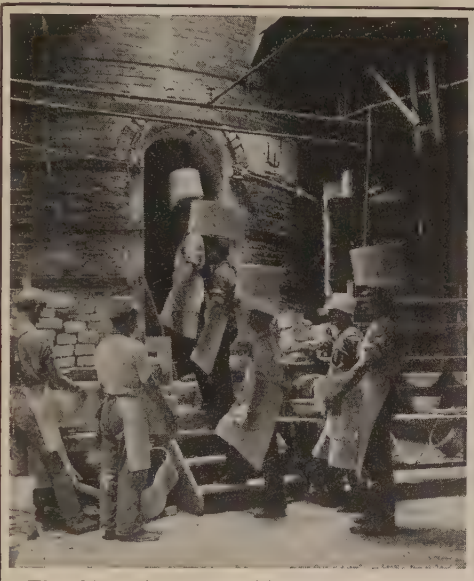


Fig. 223. Pottery molds ready for baking

204. Lumbering.—There is still much lumbering in the forests of Michigan, Wisconsin, and Minnesota, though most of the white pine and much of the other timber have been cut. So much of the timber of these North Central States has now been cut that the industry is no longer so important as it once was, or as it is now in some states of the South and on the Pacific coast.

205. Lumber Markets and Manufactures.—Duluth and Superior, at the head of Lake Superior, are centers for lumber; and Minneapolis, Minnesota, and Oshkosh, Wisconsin, are other large lumber markets. At Sheboygan, Wisconsin, are large chair factories. Grand Rapids, Michigan, and Rockford, Illinois, are especially known as furniture-manufacturing cities. The output of their factories, including all grades of office, house, and school furniture, is sold in all parts of the country.

The making of farming implements has become a very important industry in this group of states, for here are found: (1) supplies of lumber, (2) supplies of iron, and (3) farms that offer a market for the product. Illinois makes nearly half of the agricultural implements of the country, and Chicago makes far more than any other city. Chicago is near the lumber and iron of the Lake Superior region, and has supplies of coal for her factories, and a ready market in all the prairie states. Among the many other centers of this manufacture are Moline, Peoria, and Rock Island, Illinois; Racine, Wisconsin; Springfield, Ohio; and South Bend, Indiana.

Review.—1. What three states furnish the iron ore of the Lake Superior region? 2. From what ports is it shipped? 3. At what ports is most of it unloaded? 4. Why are Lake Erie ports favorable to iron manufactures?

5. What part of Illinois is underlain by coal beds? 6. What other states have coal fields?

7. Give an account of the copper production in northern Michigan. 8. What are the principal uses of copper?

9. What states of this group produce the most petroleum? 10. What states have large plants for making cement? 11. What metals are mined near Joplin? 12. What industry is important at East Liverpool?

13. Where are the chief timber lands of the region? 14. Name and locate some of the chief cities having lumber industries. 15. What conditions make a place suitable for the manufacture of farm implements? 16. Name and locate two cities with large manufactures of furniture; two with large manufactures of agricultural implements.

CITIES

206. Cities of the Great Lakes.—Of the twelve or thirteen largest cities in the United States, five are on the Great Lakes. They are Chicago and Milwaukee on Lake Michigan, Cleveland and Buffalo on Lake Erie, and Detroit. The last-named city is on the Detroit River, but it is on the line of lake traffic, and is therefore properly thought of as one of the lake cities.

207. Chicago.—Of these cities Chicago is much the largest, with a population of over 2,700,000. It is the fifth city of the world, being surpassed in population only by London, New York, Berlin, and Paris. Where Chicago now stands a town was first laid out in 1830. It is near the head of Lake Michigan, the only one of the Great Lakes that lies wholly within the United States (Figs. 202, 224). Not far from Chicago are the rich fields, mines, and forests of Michigan, Wisconsin, Indiana, and Illinois, and the city has naturally become the center of great business activity. The country on the east, south, and west is so nearly level over large areas that many railroads have been easily built from the city, extending far beyond the states that lie on the shores of Lake Michigan. These railroads, the shipping on the lakes, the vast and rich prairies, and the coal, iron, copper, and lumber that are not far away, have all helped to make Chicago the chief city of the central lowland of North America.

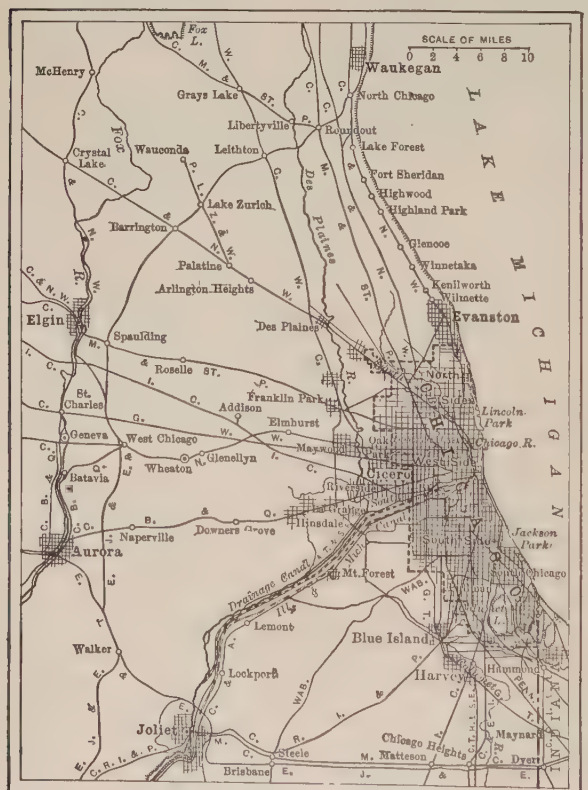


Fig. 224. Chicago and vicinity

A small stream called the Chicago River has been deepened and forms part of the harbor of the city. The outer harbor is protected by long breakwaters. The water supply of Chicago comes from Lake Michigan. It is taken from the bottom of the lake at a point some miles out from the shore. To avoid the pollution of the water with sewage the city dug the Drainage Canal. This canal is cut through earth and rock, and is nearly 30 miles long, with a minimum depth of about 22 feet, and a width that varies from 200 to 290 feet at the surface. It conducts the waste of the city, mingled with water from Lake Michigan, to the Illinois River. It is hoped at some future time to make use of this canal as the connecting link between the Great Lakes and the Mississippi River system and to make it an important route for commerce whenever the channel of the Mississippi is deepened enough to permit the use of larger vessels.

Chicago has many lofty business buildings (Fig. 10), splendid boulevards and parks, and the means of transportation common to great cities, such as surface and elevated railroads. There are also subways for carrying freight from one part of the city to another. Iron, coal, and grain are the staple commodities carried by its ships. Its stockyards (Fig. 225) and meat-packing business are the largest in the world. In the making of agricultural im-

Fig. 225. Part of the Chicago stockyards, which cover 500 acres

plements it is the first city in the world (Sec. 205), and in the manufacture of clothing it is second only to New York. It has the leading grain exchange of the country, and its elevators have a capacity of many million bushels. It manufactures much iron and steel. The parlor, sleeping, and dining cars on many of the American railroads are made in Pullman, a part of Chicago, and many street and freight cars also are built there.

208. **Other Lake Cities.**—Milwaukee is on the shore of Lake Michigan, about 85 miles north of Chicago, and is the chief city of Wisconsin. Like Chicago, it has the advantage of sending and receiving goods both by lake and by railroad. Its manufactures include leather, in which Milwaukee ranks first among cities; machinery, iron and steel, flour, knit goods, packed meats, and shoes. Milwaukee is an important grain-shipping port and has enormous grain elevators. It is also a distributing point for the coal brought in by lake steamers from Michigan, Ohio, and Pennsylvania, and shipped throughout the Northwest.

Among other cities on Lake Michigan are Racine in Wisconsin, a manufacturing center for agricultural implements, automobiles, and carriages; and Gary in Indiana, a steel-making city of recent origin.

At the head of Lake Superior are Duluth in Minnesota and Superior in Wisconsin, which have iron furnaces and great steel mills, and ship iron ore, lumber, and grain. These cities are coal-distributing centers for the Northwest, and have large grain elevators and ore docks.

Bay City and Saginaw, near Lake Huron, are manufacturing cities and trading centers for large agricultural regions.

All traffic from the upper to the lower lakes passes the city of Detroit (Fig. 226). This city is an important railroad center and there is a railroad tunnel under the Detroit River. Detroit is fourth in size among the cities of the United States and has manufactures of drugs, machinery, stoves, and, most important of all, automobiles, motor trucks, and airplanes and their parts and accessories. Highland Park and Hamtramck, although politically independent, are closely identified with Detroit; their chief industry is the making of automobiles. Other Michigan cities in which this is an important industry are Flint, Jackson, Pontiac, and Lansing, the capital of the state.

Fig. 226. Hotels on Grand Circus Park, Detroit

Several important cities in Ohio are on Lake Erie. Cleveland is the greatest of these. Like Chicago, it has a river harbor. It receives iron ore (Fig. 227) that is on the way from Lake Superior to Pittsburgh, and ships coal to all points on the upper lakes. Much of the coal and the iron ore received in Cleveland are not shipped out of the city, for Cleveland has vast iron industries, including many foundries. It also refines petroleum and builds ships for lake traffic. Among its many other manufactures are automobiles and clothing.

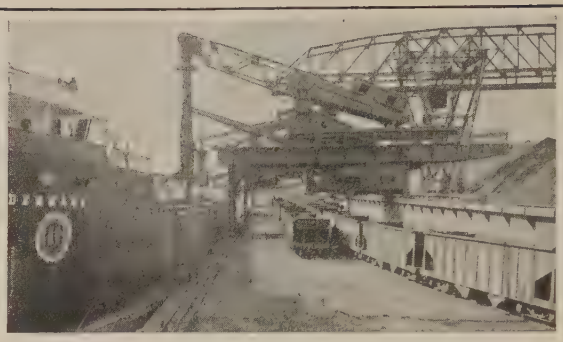


Fig. 227. Unloading iron ore at Cleveland

Toledo, at the west end of Lake Erie, on a fine river harbor, has a large trade by lake and rail. Among its manufactures are iron and steel goods, automobiles, electrical machinery, glass, clothing, and ships.

209. Cities of the Mississippi River.—St. Louis, the chief city of Missouri and of the country west of the Mississippi River, is the largest city on the Mississippi River system. It is a little below the mouth of the Missouri River (Fig. 228) and has a position midway between the traffic of the upper and that of the lower Mississippi. Railroads from Chicago, Pittsburgh, New York, Philadelphia, and Baltimore center here. From St. Louis other railroads lead to the trade centers of the South—New Orleans, Memphis, and Atlanta—and those of the Southwest. Midway between the East and the West, and the North and the South, St. Louis handles a great variety of products, including tobacco and cotton from the South, meat from the West, wheat from the North, coal from Illinois, and the lead, zinc, coal, glass, and iron of Missouri. It is a great lumber and fur market, and its manufactures include boots and shoes, clothing, tobacco, chemicals, and railroad and street cars. It is also a meat-packing center.

Several bridges cross the Mississippi River at St. Louis. On the opposite side of the river is East St. Louis, with flour mills and other factories, besides some large meat-packing establishments just outside the city limits. East St. Louis is in Illinois.

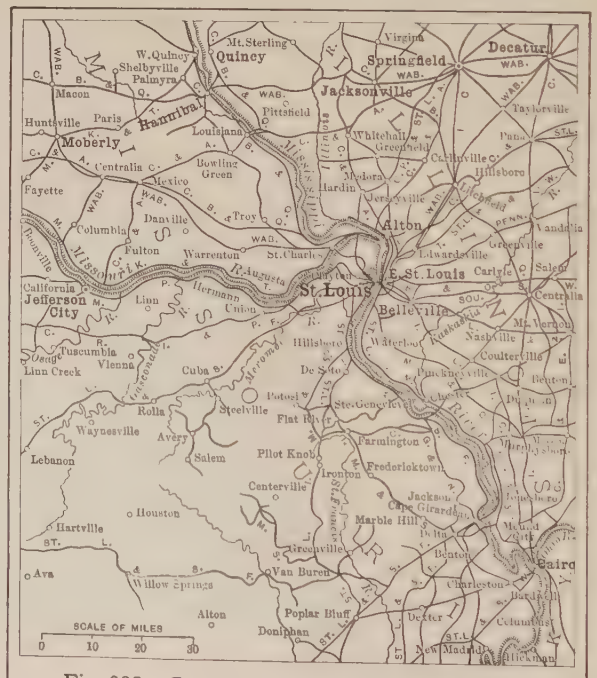


Fig. 228. St. Louis and surrounding country

At Keokuk, Iowa, 140 miles northwest of St. Louis, is a concrete dam across the Mississippi River, 31 feet high and nearly a mile long, the greatest power dam in the world (Fig. 229). In the power house the water turns immense turbines and generates electricity. Most of this power is used in driving machinery and street cars in St. Louis and other cities. Steamboats going up or down the river pass the dam by means of a lock.

Fig. 229. Keokuk dam across the Mississippi, with power house, lock, and dry dock

On the Mississippi, between St. Louis and Keokuk, is Quincy, Illinois, with stove works and other factories. Still farther up the river is an important industrial center formed by Davenport, Iowa, and Rock Island and Moline, Illinois. Davenport manufactures flour, locomotives, and steel cars; Rock Island manufactures farm implements; and Moline is known for steel plows. Other important cities on the river are Dubuque, Iowa, a manufacturing city and distributing center for lumber, and La Crosse, Wisconsin, an important center for northwestern trade, especially lumber.

At the head of navigation on the Mississippi River are St. Paul and Minneapolis in Minnesota. St. Paul is the capital of the state, and Minneapolis is the largest city. The two cities are so close to each other as to be one center of population, having together more than 600,000 people. They are often called the Twin Cities. Minneapolis owes its development as a manufacturing city to the water power of the Falls of St. Anthony in the Mississippi River. The great wheat fields of the northwest are near, and Minneapolis has become the largest center in the world for making flour. It also has large linseed oil mills (Sec. 189). St. Paul has a large wholesale and retail trade and is a printing and publishing center. Many railroads center in the two cities (Fig. 206), with lines running eastward to Milwaukee and Chicago, northward to Winnipeg, westward to Seattle and Portland, and southward to St. Louis.

210. Cities of the Missouri Basin.—On the Missouri River in Missouri is Kansas City, with a large trade in live stock, grain, and agricultural implements. Across the state line is Kansas City, Kansas, which, although much smaller than the sister city in Missouri, is the largest city in Kansas. Meat packing is the leading industry, and Kansas City is one of the largest live-stock markets in the world.

Up the river is St. Joseph, Missouri, which is also a trade and meat-packing center. On the Missouri in Nebraska is Omaha, a great railroad center with lead and silver smelting and refining works, and great packing houses. On the Iowa side of the river, opposite Omaha, is the smaller city of Council Bluffs, a trading center for the surrounding region, particularly in agricultural implements, and the eastern terminus of the Union Pacific Railroad.

Some distance west of the Missouri River are Topeka in Kansas and Lincoln in Nebraska, each the state capital and the trade center of a fertile and productive farming region. The cities of North Dakota and South Dakota are still small because the natural resources of these states have not been fully developed. Sioux Falls is the leading railroad center and the largest city of South Dakota; and Fargo, on the Red River, is the largest city of North Dakota.

Springfield, the largest city of southwestern Missouri, in the Ozark Plateau, just outside the Missouri basin, is the trade center of a mining, lumbering, and farming section.

211. Cities of the Ohio River.—Cincinnati is the largest port on the Ohio River except Pittsburgh, and is an important railway center. It is a gateway to the South, the city having built its own railroad to Chattanooga. It is a manufacturing center for boots and shoes, clothing, machinery, tools, and ornamental iron. Its Rookwood pottery has a world-wide reputation (Fig. 230). It is a large market for distributing fruits and vegetables, and handles large amounts of hardwood lumber. Many residents of adjoining cities in Ohio and Kentucky carry on business in Cincinnati.

Fig. 230. A glimpse of Cincinnati. At the left is the Rookwood Pottery

On the Ohio River in Indiana is Evansville, a hardwood lumber market. It has flour and grist mills and furniture factories.

212. Other Cities.—Des Moines, the capital, largest city, and chief trade center of Iowa, is in the central part of that state. In Ohio, Indiana, and Illinois there are many important cities not on lakes or on rivers of navigable size. Among these the largest is Indianapolis. It is an important center of steam and electric railroads (Fig. 235), and is the center of trade for the state. It has large pork-packing establishments, machine shops, and automobile and other factories. In Indiana, also, Fort Wayne has large machine shops and car shops; South Bend manufactures carriages, wagons, and plows; and Terre Haute has flour mills and machine shops.

In Illinois, there are large watch factories at Elgin, at Peoria, and at Springfield, the capital. Rockford manufactures furniture, machine tools, and agricultural implements. Decatur has flour mills. Aurora, Danville, and Bloomington have railroad repair shops.

Columbus, the capital of Ohio, is a large city near the coal and iron fields of the state, and has many manufactures, especially of machinery, cars, and shoes. At Dayton, another large city of Ohio, are manufactured railroad cars, airplanes, and most of the world's supply of cash registers. Akron is vastly important in manufactures of rubber. Hamilton has paper and other factories. Lima is the center of an oil region.

213. Educational Centers.—Most of the universities and colleges of the Atlantic states are supported by the gifts of private persons. In the North Central region, as generally in the South and West, every state supports a university. Among the largest are the University of Michigan at Ann Arbor; of Wisconsin at Madison, the state capital; of Minnesota at Minneapolis; and of Illinois at Urbana. Some others also, including the Ohio State University, the University of Missouri, and the University of Nebraska, enroll several thousand students each. In some states, as Iowa, Kansas, and Indiana, the state college of agriculture and mechanic arts is not part of the state university, but is maintained as a separate institution.

There are also many large universities and colleges supported by private gifts. Among these the largest are the University of Chicago (Fig. 231), and Northwestern University at Evanston, Illinois. Industrial and technical schools abound in this region, and there are also many normal schools.

Review.—1. Compare Chicago as to size with other great cities of the world. 2. What are its advantages of location? 3. What are its chief industries? 4. Give an account of the Drainage Canal.

5. What are the industries of Milwaukee? 6. What are the chief ports of Lake Superior? 7. Where is Detroit, and what is its chief industry? 8. What are the principal industries of Cleveland? 9. In what respect is St. Louis well situated for transportation? For manufactures? 10. Where is the largest power dam in the United States, and how is it used? 11. Name and locate the Twin Cities. 12. Name and describe three other important cities on the Mississippi River.

13. What two cities of the same name are on the Missouri River? 14. What are their industries? 15. What are the other large cities on the Missouri River in this group of states?

16. Name the principal cities that stand on the banks of the Ohio River.

17. In this group of states, where are rubber goods manufactured? Plows? Watches? Cash registers?

18. Make from memory an outline map of the North Central States, showing the rivers and the capital and chief cities of each state.

TRANSPORTATION

214. Early Ways of Travel.—By transportation we mean the moving of men and products from one place to another. If a family, or the people of a small village, should raise all their own food, grow cotton, wool, or flax and make their own clothing, and cut down trees and build their own houses, and if they did not wish to travel, they would not need facilities for transportation. But the moment they send for things that are produced elsewhere, or whenever they would travel for any purpose, roads and vehicles become necessary. If we imagine all the roads removed from our neighborhood and ourselves compelled to beat a path across the fields or through the woods in order to go anywhere, we shall understand what the first white settlers in America had to do.

The earliest routes of travel were trails, such as were used by the Indians and even by the buffalo and other animals that walked long distances to reach watering places and salt springs. Goods were carried on the backs of men and of beasts of burden, sometimes through vast forests and across wide deserts. Besides traveling by land, both the savage and the pioneer built canoes and transported their loads on lakes and streams, where, as on the Great Lakes or the Mississippi River, they could easily paddle, or drift with the current, for hundreds of miles.

215. Roads and Railroads.—As soon as possible the pioneers and early settlers cut roadways through the forests of the East; but at first the roads were not good, for there were stumps, stones, and mud that made the way almost impassable. On the prairies of the West no trees had to be cut, and the task was easier.

More than a hundred years ago there was a movement to build good roads along the Atlantic Lowland and across the Appalachian Mountains. These roads were often called turnpikes, and to meet the cost of building and keeping them in repair travelers paid a small sum as toll at many toll gates. Soon, however, railroads were built from New York, Philadelphia, and Baltimore westward to Buffalo and Pittsburgh. They were later extended westward along the shores of the Great Lakes and through the Ohio Valley and beyond until they now cover the North Central States like a network (Fig. 82).

Fig. 231. Part of the University of Chicago

As soon as a good road was built along the Hudson Valley, farmers found it easier to send their grain, fruit, and vegetables to New York, and the village storekeepers could more easily get their stock for the season. When a turnpike road reached out from Philadelphia to the Susquehanna River, the rich lowland of Pennsylvania could easily exchange its farm products for goods made in the city, or brought to the city from Europe. After the Erie Canal was dug (Sec. 122) the price paid to the western farmers for wheat was higher because it could be cheaply carried to markets where there was a great demand for it. When railroads reached Chicago from New York, the city on Lake Michigan could transact all necessary business with New York swiftly (Fig. 232), while it could still send heavy freight by way of the Great Lakes, the Erie Canal, and the Hudson River.

Fig. 232. A fast train from Chicago to New York

Now we are realizing that we need better roads both for carriages and wagons and for motor cars (Fig. 233). The government wishes good roads for the rural free delivery of the mails. The townspeople wish them in order that it may be easier for people to come into town to trade. The farmer wishes them for easy access to school, church, and market. He finds that over good roads he can haul a much greater load of apples, wheat, or potatoes, in less time, and with less strain on horses, harness, and wagon.

216. Transportation in the North Central States.—No other part of the United States is so well adapted to the development of transportation routes to all parts of the country as the North Central region. The country is nearly level, or at least is not so hilly as to interfere with the making of good roads. Though many prairie roads are muddy, generally there are quarries near at hand that can supply suitable stone for making excellent roads.

It costs less to build railroads in a level country than in a mountainous region, because there are no expensive cuts and embankments. It has been easy to join Cleveland, Detroit, and Cincinnati by many railroads with Chicago, Milwaukee, and Indianapolis, and other railroads have been built westward to St. Paul, Minneapolis, St. Louis, Kansas City, Denver, and other western cities. In the older days there was much traffic down the Ohio and Mississippi rivers from Pittsburgh, Cincinnati, Louisville, and St. Louis, to Memphis and New Orleans. In later years railroads

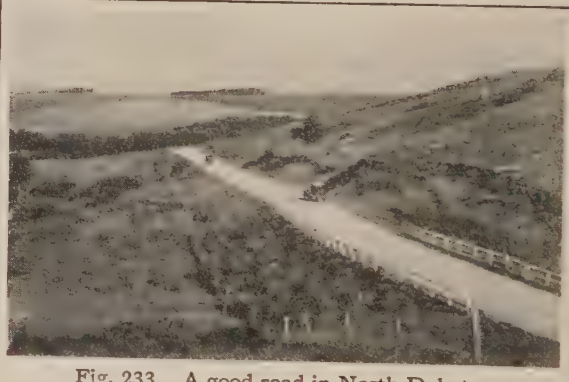


Fig. 233. A good road in North Dakota

have been built from north to south along the Mississippi Valley, and there is not so much traffic on the rivers, except that vast amounts of coal are carried down the Ohio River from Pennsylvania and West Virginia.

The Great Lakes, although closed to navigation by ice during the coldest months of the year, make one of the chief routes for freight in the world. Ships large enough to cross the ocean sail on these lakes and carry freight and people to and from Chicago, Milwaukee, Duluth, Detroit, Toledo, Cleveland, and Buffalo. Boats drawing fourteen feet of water can pass through the Welland Canal to Lake Ontario, the St. Lawrence River, and the Atlantic Ocean.

Fig. 234. Lock in a Soo Canal

Past the rapids in the St. Marys River the American government has built two canals (with four separate locks), and the Canadian government one canal. Through these "Soo Canals" an enormous amount of freight passes. Iron ore passes down to ports on Lake Erie and Lake Michigan. Wheat and lumber also are shipped in large amounts. Coal is the largest item of the freight shipped up the lakes.

Thus in the North Central region transportation is easy. The region is mainly a lowland, there is a network of roads, it is crossed by great rivers, and has on its northern boundary the greatest system of fresh-water navigation in the world.

In this region also there are systems of electric interurban railroads (Fig. 235). The use of motor busses and motor trucks is of growing importance as a means of transportation.

A business man of Chicago may go to and from his suburban home by steam or electric car. By means of the telephone he can transact business with men in Milwaukee, Minneapolis, St. Louis, or more distant cities. He can go to New Orleans or New York in a day, and in less than three days to San Francisco, without losing meals or sleep. In three weeks he can visit London, Paris, or Berlin, transact business, and return to his home. He lives in a region so rich in resources that many others can live near him in city and country. All can readily transact business, not only with one another, but with those who are far away.

Fig. 235. An interurban railroad car, Indianapolis

Review.—1. What favors land transportation in this region? 2. What are the two great systems of water transportation? 3. Which is now the more important? 4. Where are the Soo Canals? What conditions made them necessary? 5. What are the chief commodities carried on the Great Lakes? 6. What advantages do railroads offer to a great city? 7. Name several means of transportation other than steam railroads. 8. What are the advantages, to the farmer, of good roads?

Review by States.—Ohio. 9. What advantages has Ohio for transportation? 10. What is the density of population (Fig. 80)? How does it compare with that of Illinois? North Dakota? Pennsylvania? Georgia? 11. Name and locate the capital of Ohio. Where is Cleveland? Cincinnati? Name five other important cities of this state. 12. In which of these eight cities are iron and steel manufactures important? 13. What are the mineral products of Ohio? 14. What are the chief crops?

Indiana (Ind.). 15. By what states is Indiana bounded? By what rivers? 16. How does the surface of northern Indiana differ from that of the southern part of the state? 17. What is the chief Indiana city on the Ohio River? 18. Name and locate the state capital. 19. What very great city lies just beyond the border of Indiana? 20. What young Indiana city is noted for steel manufacture?

Illinois (Ill.). 21. Has Illinois or Indiana the longer coast line on Lake Michigan? 22. Describe the course of the Illinois River. 23. What part of Illinois is prairie? 24. What are the chief products of the farms? What are the chief mineral products? 25. What are the chief industries of Chicago? 26. What are some of the industries of Peoria, Joliet, Elgin, and East St. Louis?

Michigan (Mich.). 27. What is the chief city of Michigan and why is its position favorable for growth? 28. What cities are on or near the shores of Saginaw Bay? 29. Where is Grand Rapids, and what is its principal industry? 30. Name three cities where automobiles are made; one that ships celery; one that manufactures breakfast foods. 31. What two metals are mined in northern Michigan? 32. What makes the climate of southern Michigan favorable for raising fruit?

Wisconsin (Wis.). 33. What rivers and lakes form parts of the state boundary? 34. What is the principal river within the state? Describe its course. 35. Name and locate the state capital. 36. What is the chief city of the state? What are its leading industries? 37. Locate Oshkosh, Racine, and La Crosse. 38. What metal is mined in northern Wisconsin? 39. Name two Wisconsin ports on Lake Superior. What kinds of freight are shipped from them?

Minnesota (Minn.). 40. Name five rivers and two lakes that form parts of the boundary. 41. What river crosses the state? 42. Why has Minnesota thousands of small lakes within its boundaries? 43. Where are the forests of this state? The prairies? 44. Describe the climate. 45. What kind of wheat is raised in Minnesota? 46. From what ports is iron ore shipped? 47. What are the two principal cities of the state? 48. What are the industries of Minneapolis? Duluth?

Iowa. 49. What states border Iowa? What rivers? 50. What is the most important crop? 51. In what respects do the surface and farm products resemble those of Illinois? 52. Name the capital; two cities on the Missouri River; two on the Mississippi. 53. Describe the course of the Des Moines River. 54. For what is Sioux City important? Keokuk?

Missouri (Mo.). 55. Contrast the surface of northern and of southern Missouri. 56. What river crosses the state? 57. Name and locate the state capital. 58. What are the important industries of St. Louis? 59. Name three cities in the western part of the state. For what is each important? 60. Name four important products of Missouri.

North Dakota (N. Dak.). 61. What river crosses North Dakota? 62. Describe the surface and climate. What differences are there between the eastern and western parts? 63. What are the chief products of the state? 64. Name and locate the state capital. 65. What important city is on the Red River?

South Dakota (S. Dak.). 66. In what respects does South Dakota resemble North Dakota? 67. Where are the Black Hills? 68. What are the important products of the state? 69. Name and locate the state capital; the chief city of the state. 70. In what part of South Dakota are its chief forests?

Nebraska (Nebr.). 71. What long river flows through the central parts of Nebraska? 72. What city is near its junction with the Missouri River? 73. What are its leading industries? 74. In what general direction does the surface of Nebraska slope? How do you know this? 75. What are the important grain crops of Nebraska? 76. Name and locate the state capital.

Kansas (Kans.). 77. Where has Kansas a natural boundary? 78. What states adjoin Kansas? 79. What is the largest city of Kansas? Near what larger city is it? 80. What river enters the Missouri at Kansas City? 81. What great river crosses Kansas? 82. Name and locate the state capital. 83. What are the important products of Kansas?

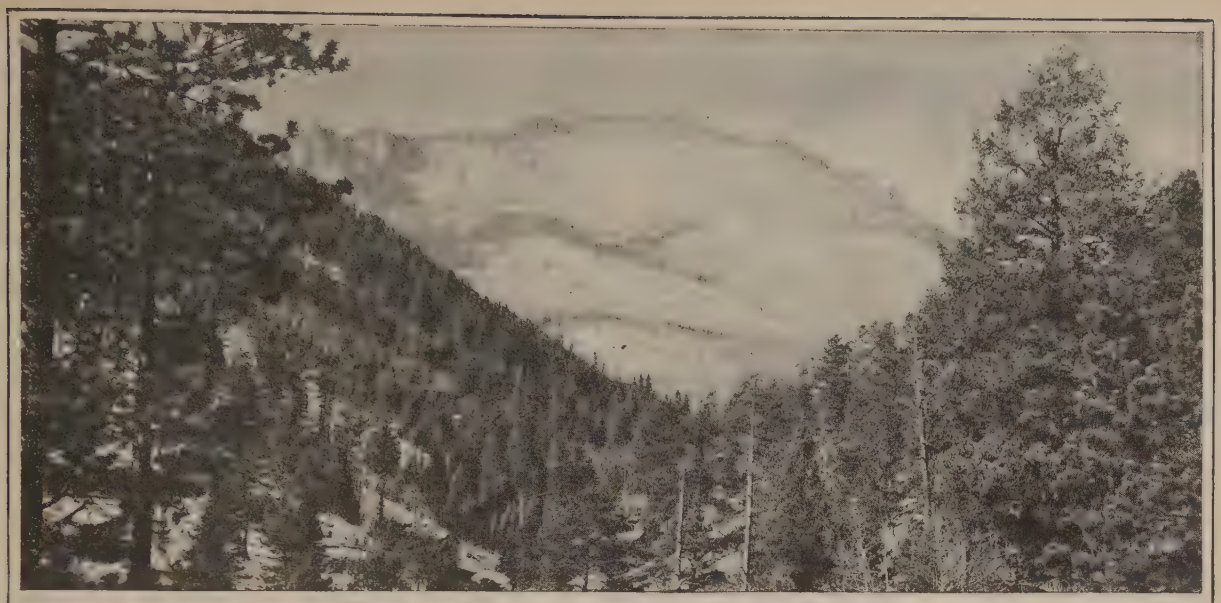


Fig. 236. Pikes Peak, in the central part of Colorado

THE PLATEAU STATES

217. Explorers and Pioneers.—The first white men who visited the Plateau region were Spanish explorers who entered it from the south. Until 1848 the southern part of the region belonged to Mexico.

After the Louisiana Purchase in 1803 (Sec. 66) an expedition was sent out under Captains Lewis and Clark to explore the northwestern wilderness. They started at St. Louis, went up the Missouri River, crossed the Rocky Mountains, and went down the Columbia River to the Pacific coast.

When Lewis and Clark were on the way home in 1806, a young officer of the army, Captain Zebulon Pike, started westward on a more southern trail. He explored part of the Rocky Mountains, and his name was given to the great peak that overlooks the plains of Colorado (Fig. 236).

About thirty years later Captain Bonneville carried on explorations in Idaho, Washington, Utah, and Nevada.

These are a few of the many daring men who "broke the wilderness," and made known the wonders of its sandy deserts, deep canyons, mighty waterfalls, snowclad mountains, and fertile valleys.

The trails of the pioneers were bordered by the graves of those who died on the way. Thus in hope and daring the life of the West began. Railroads now follow the trails, and homes and palatial hotels have taken the place of tents. The Indians have been subdued after many fierce wars and much wrongdoing on both sides. They no longer roam the wilds, but are settled on government reservations, or have homes like those of white men. They seldom live by the chase, but have fixed occupations. Many of them till the soil, keep sheep, or pursue some of their native industries, such as the weaving of blankets, rugs, and baskets.

Great as the industrial progress of the Plateau States has been, much remains to be done in opening the stores of iron, coal, and precious metals, and in bringing the suitable regions under cultivation. Even now, however, the people of both city and country have advantages similar to those enjoyed by the people of the older East.

ELEVATIONS IN FEET
OVER 5000
2000 TO 5000
1000 TO 2000
500 TO 1000
SEA LEVEL TO 500
BELOW SEA LEVEL
Fig. 237
Physical and Political
PLATEAU STATES
Scale of Statute Miles
185 MILES TO ONE INCH
Capital of States thus: ⊙
COPYRIGHT, BY AMERICAN BOOK COMPANY.
THE MATTHEWS-NORTHRUP WORKS, BUFFALO, N. Y.
Longitude West from Greenwich
WASHINGTON
OREGON
CALIFORNIA
NEVADA
IDAHO
MONTANA
WYOMING
UTAH
ARIZONA
COLORADO
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLA.
TEXAS
PACIFIC OCEAN
GREAT BASIN
GREAT SALT LAKE DESERT
GILA DESERT
Columbia R.
Snake R.
Colorado R.
Rio Grande
Missouri R.
Yellowstone R.
Salt Lake City
Denver
Colorado Springs
Pueblo
Cheyenne
Boise
Spokane
Seattle
Portland
Los Angeles
San Diego
Phoenix
Albuquerque
Santa Fe
Las Vegas
Reno
Carson City
Tucson
El Paso
Great Falls
Billings
Missoula
Butte
Helena
Yellowstone Park
Glacier National Park
Grand Canyon
Zion Canyon
Bryce Canyon
Mesa Verde
Rocky Mts.
Sierra Nevada
Wasatch Mts.
Uinta Mts.
Black Hills
Pikes Peak
Gulf of California
MEXICO
ALBERTA
SASKATCHEWAN
BRITISH COLUMBIA
120°
115°
110°
105°
49°
45°
40°
35°

THE PLATEAU STATES

	Area, Sq. Mi.	Population, 1920	Capital
Montana	146,572	548,889	Helena
Idaho	84,313	431,866	Boise
Wyoming	97,914	194,402	Cheyenne
Colorado	103,948	939,629	Denver
New Mexico	122,634	360,350	Santa Fe
Arizona	113,956	334,162	Phoenix
Utah	84,990	449,396	Salt Lake City
Nevada	110,690	77,407	Carson City

Map Study.—1. What states are included in this group? 2. Trace the Rocky Mountains through the several states in which they are found. 3. What region is east of the Rocky Mountains (Fig. 58)? 4. What is the principal mountain range of Utah, and in what direction does it extend?

5. In what state are the most northern waters of the Colorado River system? 6. What other states contribute waters to this great river? 7. In what state is the Grand Canyon of the Colorado?

8. What large river has many sources in the northeastern part of this region? 9. What tributary of the Missouri River flows from Colorado? 10. What tributary of the Mississippi flows from the same state? 11. Where is the Yellowstone National Park? 12. Trace the course of the Yellowstone River.

13. What river crosses southern Idaho? 14. To what river system does it belong?

15. What lands belong to the Great Basin? 16. Are there any large rivers in this region? 17. Where do the rivers find their outlet?

18. What states of this group border on Mexico? 19. What states border on Canada? 20. What parallel of latitude forms the boundary between these states and Canada? 21. How far is it in this region from Mexico to Canada, allowing 69 miles for each degree of latitude? 22. What states adjoin the region on the west?

23. Where is the largest lake within this group of states?

DESCRIPTION OF THE REGION

218. Surface and Drainage.—The states of the Plateau group occupy the central part of the vast upland of the western United States. The Great Plains are so far above sea level that they are really a plateau. In eastern Montana, Wyoming, Colorado, and New Mexico, the plateau is from 4000 to 6000 feet in altitude. Some smaller plateaus among the mountain ranges, in western Colorado, Utah, and other states, are higher, in places reaching altitudes of 7000 or 8000 feet. Above the plateaus rise the Rocky Mountains and other ranges to altitudes of from 10,000 to 14,000 feet (Fig. 15). Many of the highest peaks are nearly three miles above the level of the sea.

The group includes eight states and covers more than 800,000 square miles of surface, or more than one fourth of the country. Even the smallest state of the group is much larger than the total area of the New England States.

The Plateau States include a part or all of the following streams and drainage basins: (1) The western sources of the Mississippi, including the Arkansas and many long branches of the Missouri; (2) all the upper waters of the Rio Grande; (3) almost all the basin of the Colorado River; (4) most of the Great Basin, whose waters find no outlet to the sea; (5) most of the basin of the Snake River, and parts of smaller branches of the Columbia River.

The greatest mountain mass is that of the Rocky Mountains. In the north they lie on the boundary of Idaho and Montana, and reach far into each state. In Wyoming they are high in the northwest, but lower in the south-central parts, where the Union Pacific Railroad crosses the state. In Colorado there are several high ridges, and between the ridges are valleys, some of which are called *parks*. These parks are mainly grasslands, although parts of them are fine farming regions. The Rocky Mountain system continues south through New Mexico and into western Texas. The continental divide, or watershed between the Atlantic and Pacific oceans, follows the Rocky Mountains from the Canadian to the Mexican boundary (Fig. 237). In the moun-

tains of Colorado are the sources of streams that feed the Missouri, the Arkansas, the Rio Grande, and the Colorado.

The Wasatch Mountains (Fig. 238) are a short range, mainly in Utah. The range runs north and south and separates the Colorado Plateaus on the east from the Great Basin on the west. In the Great Basin a number of parallel ridges have a north and south direction. West of the basin is the Sierra Nevada. All of this range, except some of the eastern foothills, is in California.

219. Climate and Vegetation.—The climate of this region shows wide variation between north and south. In Montana the temperature averages less than 70° in July and 20° in January; in southwestern Arizona it averages 90° in July and 50° in January. Severe winters may interfere with pasturing flocks and herds on the plains of Montana and Wyoming, but in the pasture lands of New Mexico and Arizona cattle and sheep can live out of doors at all seasons. Southwestern Arizona is low, lies in a southern latitude, and is one of the warmest parts of the United States. In Montana, Utah, and Colorado there is perpetual snow on some of the higher mountains. Most of the plateau surface is so high that the air is always cool at night, and comfortable in the shade, even at midday.

For the rainfall, read again section 60. Where there is enough moisture the mountains have much forest, except on the summits and highest slopes. The Great Basin is one of the driest parts of the region. The rainfall there is small and the evaporation rapid; the rivers flow into lakes or sinks which have no outlet to the sea. As evaporation goes on, the salt and other minerals dissolved from the rocks by rain water remain in the lakes, and their waters become salt. The largest of these lakes is Great Salt Lake in Utah, with an area of about 2500 square miles. In some shallow basins there are lakes in the rainy season and salt flats in the dry season.

220. The West Compared with the East.—There are sharp contrasts between the eastern and the western parts of the United States. In the East the fields are generally green and most of the mountains are low enough to be covered with forest. In the more arid parts of the West, grasses and shrubs are scattered and the landscape is gray, like the hue of the desert, except where lines of trees border the streams, and where irrigation has covered the fields with green. In other parts the land is high and rugged, partly covered with forests on the middle slopes, and rocky and snow-clad on the upper slopes and summits.

Fig. 238. Wasatch Mountains, from Salt Lake City

U. S. Geological Survey

Fig. 239. Royal Gorge of the Arkansas River

Fig. 240. Snake River Canyon, Idaho

In the East the rains come gently, or in storms which are seldom of great violence. In the drier parts of the West, rains come infrequently, and the dry season may last for months. In such regions there are occasional violent storms, called *cloudbursts*, when torrents of water rush down the dry beds of the rivers. In the East the air is often humid; that is, full of moisture, which makes it sultry in hot weather, and chilly in cold weather. In the West there is little moisture in the air, which is clear and bracing at almost all times. In the Plateau States the general elevation of the land is nearly or quite a mile above sea level, the air is thin or rare, and people breathe more rapidly and deeply. Because of the rarity and dryness of the air the region has become a noted health resort. Persons who have just come from the dense air of the lowlands are sometimes made uncomfortable by the rarefied air, and are unable to run or labor as usual. The clearness of the air makes the sun and the stars seem to rise and set suddenly, and at night the heavens are far more brilliant and more stars can be seen than in the East.

There is a difference in the natural scenery also as compared with the East. The mountains are higher and more majestic. In many gorges and on many peaks there are snows that do not disappear even in midsummer. On the desert plains, the winds sweep with violence, for there are no barriers to hinder their movement. There is no good cover of grasses and roots to hold down the earth and sand, and enormous quantities of dust are sometimes blown into the air. Such a dust storm may be somewhat like the blinding snows of a winter blizzard. In some places the winds pile up the sand into hills, forming sand dunes.

The rivers have cut deep valleys and narrow gorges in the plateaus and through the mountains. These may be half a mile or even more in depth. Examples are found in the Royal Gorge of the Arkansas River in Colorado (Fig. 239), in the canyons of the Gunnison in the same state, in the canyons of the Snake River in Idaho (Fig. 240), and especially in the Grand Canyon of the Colorado River.

Fig. 241. Grand Canyon of the Colorado River

221. The Grand Canyon of the Colorado River.—The Colorado River rises in the lofty Rocky Mountains of northern Colorado. It flows southwest across Utah, passing through many deep gorges that it has cut into the rocks of the high plateau. In this state also it is joined by the Green River, a large tributary which rises in Wyoming. When the river enters Arizona, it bends to the westward and flows in a canyon which is, in some parts, a mile deep. This is the *Grand Canyon*, the most wonderful gorge in the world (Fig. 241). At the bottom the river flows as a swift torrent, with many dangerous rapids. From the water, the walls rise in places almost vertically half a mile or more. Then the canyon widens, so that at the top it is from eight to twelve miles across.

Many side canyons join the main one, and some layers of rock, being harder than others, have been sculptured into walls, buttresses, and towers, like the buildings and cathedrals of a city built on a scale far above that of man's work. The rocks are of many colors,—reds, grays, yellows, and browns of various shades,—and under the changes of sunlight and shadow they make a world of wonders. A railroad now leads to the rim of the Grand Canyon, and every year thousands of travelers visit it.

222. The Yellowstone National Park.—In the high mountain region where the three states, Wyoming, Montana, and Idaho, come together, is the Yellowstone National Park (Fig. 242). Most of it is in the state of Wyoming. The continental divide crosses the park, which lies in the basins of the Missouri and Snake rivers.

The canyon and falls of the Yellowstone River, and hot springs and geysers to the number of a thousand or more, furnished the chief reasons for laying out a national park here. Hot springs are found in many parts of the United States, as at Hot Springs, Arkansas, and Glenwood Springs, in western Colorado. The waters of such springs have

Fig. 242. Yellowstone National Park

been heated by contact with hot rocks not far below the surface.

The park is one of the few places in the world that have *geysers*, or springs that spout hot water. "Old Faithful" is so called because once in a little over an hour, with great regularity, a column of steaming water rises from it 120 or 150 feet into the air. Other geysers spout every few hours, or days, or irregularly, but the cause is the same in all. At some distance below the surface of the earth the water in the geyser becomes so hot that it is suddenly changed into steam. The expansion of the steam forces the water above to rush out of the opening and rise high into the air. When the steam has escaped, water again collects in the geyser and is heated until the spouting is repeated.

Hot waters dissolve many substances out of the rocks. When they reach the surface, the waters become cooler and cannot hold so much dissolved matter. They deposit it at the mouth of the spring, and in this way terraces of wonderful colors and forms have

Fig. 243. Hot springs and terraces, Yellowstone Park

U. S. Dept. of Ag., Forest Service

Fig. 245. A forest ranger

been slowly built up about some of the hot springs in the park (Fig. 243).

Hunting in the park is forbidden, and animals such as elk and bear lose their fear of man and become less wild. A herd of buffalo is kept in the park. This, and a few other small herds kept in Canada and the United States, are all that remain of millions of these animals that once roamed our western plains.

There are excellent roadways and hotels in the park, and the mountain air, the wild animals, the geysers and springs, the lakes, rivers, and canyons will always attract thousands who are seeking health, pleasure, and knowledge.

223. Glacier National Park. — In 1910 the government set aside an area of about 1500 square miles in northwestern Montana as a national park. It is a region of great natural beauty, with towering peaks (Fig. 70), lovely valleys, and gem-like mountain lakes. As there are many glaciers within its borders it has been named the Glacier National Park.

224. National Forests.—In the Plateau States, and also in some other states, the government has established a number of forest reserves (Fig. 244). They are mainly in mountain districts where there is sufficient moisture for trees to grow. It is expected that these forest lands will always be kept under government control, as the preservation of the forests will prevent the washing away of the soil and the destruction of property in the valleys. Men trained in forestry, which is the science of caring for trees, have charge of these reserves. Under their direction are many forest rangers (Fig. 245), who lead

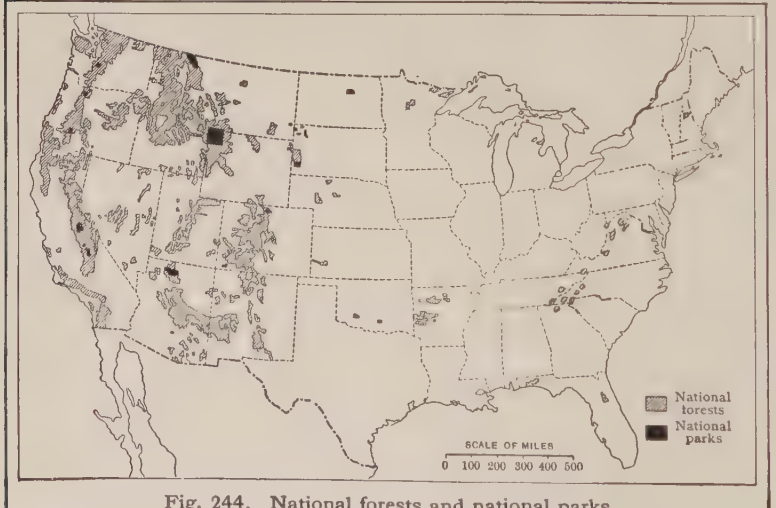


Fig. 244. National forests and national parks

a lonely but a very busy life, constantly moving about on horseback or on foot. Among many duties they prevent forest fires, put them out when started, and prevent the stealing of timber.

The reservation of these lands by the government does not mean that they cannot be used. Cattle, horses, and sheep may be pastured here, under government regulation and on payment of a small fee for each animal. The herders must put out their camp fires, and must not allow the grass to be eaten too closely. Tourists and hunters are free to use wood, and permits are given also to cut timber, but only the fullgrown or "ripe" trees. Some of the giant trees of California are included in a government reservation. There are so few of one or two species, that if this were not done they might soon become extinct.

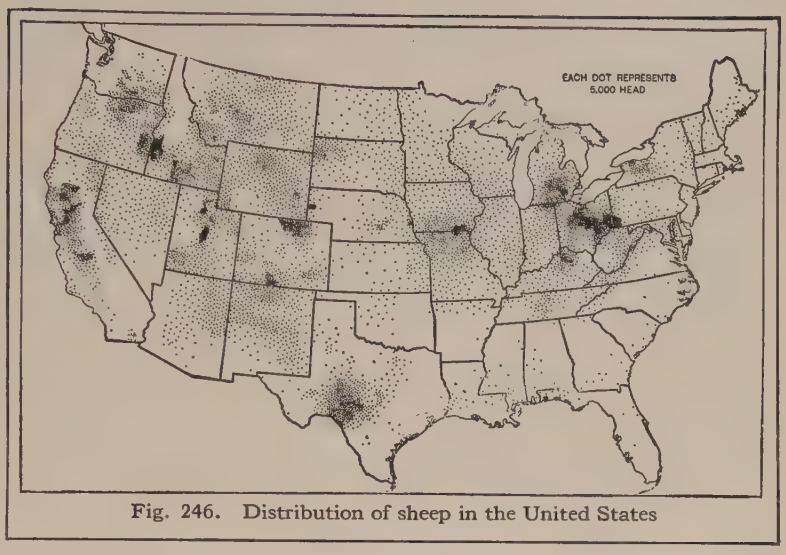


Fig. 246. Distribution of sheep in the United States

Review.—1. How large are the Plateau States as compared with New England? 2. What are the "parks" of the Rocky Mountain region? 3. Where is Pikes Peak? Why does it bear this name? 4. Describe the consequences of the small rainfall of the Great Basin.

5. Compare the East and the West in at least three respects.

6. Define *canyon*, and name the greater canyons of this region. 7. Describe the Grand Canyon of the Colorado River.

8. What region has geysers? Describe the action of a geyser. 9. In what park are there glaciers? Where is this park? 10. What are the duties of forest rangers? 11. What restrictions are put upon pasturing in the government forest reserves?

GRAZING

225. Cattle.—Cattle, sheep, and horses are raised in large numbers in the Plateau States; for much of the land is valuable only for pasture. Cattle raising is carried on in both the South Central and the North Central States (Secs. 167 and 192–194), but the industry extends westward, and is important throughout the Plateau States.

226. Sheep.—The Plateau States raise more sheep than cattle. Every state in this group has a large number of sheep, and all together the Plateau States have nearly half of the sheep in the United States. Outside this group, the largest producers of sheep are Texas in the South, California and Oregon on the Pacific coast, and Ohio, Michigan, and Missouri in the North (Fig. 246).

In the Plateau States the sheep live mainly on the open range, and many thousand may be found in the flocks of a single owner. A sheep herder and camp tender are usually in charge of each herd of two or three thousand sheep. During the summer the sheep graze on the mountains. As winter approaches they are driven to the lower ranges and thence out upon the plateau. For some months each year the herder and his camp tender live alone with only a covered wagon as a home.

As the pasturage of the plains is thin, the flocks must often be moved to fresh grounds. Sheep eat so closely that if kept long on the same pasture, they destroy even the roots of many of the plants on which they feed.

Besides the grasses of the desert, sheep feed on other plants, including low shrubs. One of these is a thorny shrub called "shad scale," and still another is "winter fat," which produces nutritious seeds that cling to the stems all winter.

Sheep may be sheared on the ranch, or driven to shearing stations. The shearers go about from ranch to ranch or from station to station, beginning in the south and going north as the season advances. In the north early summer is the shearing season. Billings, Montana, on the Yellowstone River, is one of the many centers of the sheep trade.

As in the case of cattle, every part of the sheep is valuable. The wool goes to the woolen mills. Many animals are fattened for mutton. The hides are made into leather, and the bones and other parts add to the farmer's supply of fertilizers for his fields.

The United States ranks second among the great sheep-raising countries. Australia leads all others, followed by the United States and then by Argentina. Many sheep are raised in European Russia, South Africa, and western Asia. The countries east of the Mediterranean, and Turkestan, east of the Caspian Sea, abound in sheep and shepherds, as they have for thousands of years in the past. In almost every case the sheep-raising countries of the world have wide areas of dry plains on which the sheep are pastured. Much care has been taken to improve the breeds, so that they furnish better mutton and heavy fleeces of long and fine wool.

Fig. 247. A sheep ranch in Montana

IRRIGATION AND CROPS

227. Irrigation.—In the eastern part of the United States, and on the prairies, the farmer depends on the rains to water his crops and to replenish the wells and springs that supply his home and his stock. In a time of drought he may wish he could water his potatoes or his corn, but there is usually enough moisture to bring his crops to a good harvest.

In the greater part of the Plateau States, however, the annual rainfall is small, and frequently the water that falls comes down in fierce storms and runs quickly away in torrents, or soaks into the porous soils of the plains, beyond the reach of roots. The abundant rains are in the mountains, where the climate is too cold and the land too rough for crops. On the plains, where the soil is easy to plow, there is not enough moisture.

Therefore the water in the streams is in many places made to flow upon the fields of the valleys, where it will water crops of grain, fruit, and vegetables. This is irrigation, a process that farmers have practiced since ancient times in Egypt, in India, and in many other dry regions. Even the cliff dwellers of our Southwest used irrigation in a small way, long before the Spanish explorers came to that region.

228. Irrigation in Utah.—In the year 1847, the Mormon settlers found their way to the region of Great Salt Lake, in the center of the present state of Utah. They could not have supported themselves in that dry country without

Fig. 248. Distributing ditch — one of the main canals of an irrigation system — in Arizona

watering their fields. The region first settled is at the western foot of the Wasatch Mountains. Never-failing streams flow out of these mountains, and the Mormon people dug ditches, watered their crops, and made the region productive and prosperous.

229. Irrigation in Colorado.—The greater rivers of the western mountains furnish much water to the plains, for they are fed by the rains and snows at their sources. The waters of the Platte and Arkansas rivers in Colorado have long been used for irrigation. Large ditches near Denver take water out of the South Platte River. Each ditch is tapped at many points and the water carried in smaller ditches to the fields below it. The fields are leveled, if necessary, and still smaller channels and furrows are made, to convey the water to the seeds and roots. In villages or parks the small ditches are so arranged as to water the rows or clumps of shade trees.

In the early days a man might make a ditch of his own to bring the river water to his farm, but soon so many farmers needed water that there was need of coöperation. Companies were formed to build the dams, cut the main ditches (Fig. 248), and sell to each farmer the right to use a certain amount of water. This is still done in many places, both in Colorado and in other states. In many places, also, water for irrigation is pumped from deep wells.

230. The Reclamation Service.—In 1902 the government of the United States organized the Reclamation Service, in order to reclaim, or make useful, more of the arid lands. Under this plan the government selects a suitable site on a large river and builds a great dam (Figs. 1, 249). A site is suitable if the valley is narrow, with a good bottom, if a large lake or reservoir can be formed by the dam, and if the lands down the stream

Fig. 249. A government reclamation dam, New Mexico

Fig. 250. Irrigated areas of the United States

are good, and lie in such gentle slopes or plains as to be readily reached by the water.

We must not think that citizens of all the states are taxed in order to furnish water to western farmers. The money was raised from the sale of public lands in the states where it is now expended for irrigation; and the farmers who buy the land, and use the water, must pay back to the government, in several installments, the cost of the improvements. When these payments are completed the farmer receives full title to the land. The money paid for it is used to make similar improvements in other dry regions.

There is not space in this book to describe all of these *irrigation projects*. The map (Fig. 250) shows their locations and many of the rivers that supply the water.

Some of the reservoirs made by the government really form large lakes (Fig. 249) that add much to the beauty as well as to the usefulness of the region. Great feats of engineering are required, as in the Gunnison tunnel in Colorado. Here daring surveyors and engineers found a route and dug a tunnel through a mountain from the canyon of the Gunnison to the flat lands bordering the Uncompahgre River. In the one valley there was water but little land; in the other were broad fields but very little water. Government experts have brought the two together. In some cases the reservoirs can be used to furnish water power, thereby promoting manufacture as well as agriculture.

231. Crops raised by Irrigation.—A great variety of crops is raised on the irrigated lands of the West. In the more northern states, such as Montana, Idaho, and Wyoming, wheat and other grains, vegetables, and hardy fruits are raised. Most important among these is the apple. Many large and profitable orchards are found in these states and also in Oregon and Washington, the northern states of the Pacific coast.

In Colorado millions of acres of land are "under the ditch," and there are many thousand miles of irrigation canals. Without the artificial use of water, this land would be useless save for pasturing a few animals. As a result of irrigation it is worth from $60 to $300 per acre, makes homes for many thousand people, and feeds the cities and mining camps of the state. Potatoes and other vegetables, peaches and other fruits, and the sugar beet are raised in abundance. Alfalfa produces several crops a year, and

the farms, under most careful tillage, are really large and productive gardens.

Some parts of New Mexico and Arizona have almost a tropical climate. Especially is this true along the Salt and Gila rivers in Arizona, where cotton is raised and where orchards of date palms are producing fruit. The palms were brought from Africa by the United States Department of Agriculture. On irrigated lands in California nearly every kind of grain and fruit is produced.

Fig. 251. Wheat raised by dry farming, Wyo.

232. Life in Irrigated Regions.—Farmers who make use of irrigation cannot cultivate large farms. They must spend their time on a few acres, in careful or *intensive* culture. Thus, while the mountain streams have water enough for only a small part of the dry plains, food for millions can be raised. As farms are small, people live close together, almost as in a village. Neighbors are near, schools, churches, and all the conveniences of life are close at hand. Such life develops skill and has many comforts and advantages that do not come so easily to people scattered on the large farms and ranches of the prairies and Great Plains.

233. Dry Farming.—In the drier parts of the West many early attempts at agriculture failed except where irrigation was employed. In recent years agricultural methods have been so improved that large areas have been brought under cultivation in regions where the annual rainfall is less than 20 inches. This is called *dry farming*, although of course no crop can be grown absolutely without water. The term really means farming where there is less moisture than is usually thought to be necessary.

Water in the soil is lost either by being evaporated directly from the surface or by being taken up by plants and evaporated from them. In dry farming there are four important things to do: (1) The ground must be plowed before the rainy season so that as much rain as possible will soak into the soil. (2) The surface layer of soil should be cultivated frequently so as to prevent the evaporation of the moisture; for evaporation takes place very slowly when the deep-lying moist soil is protected by a covering of finely pulverized dry soil. (3) Care should be taken to raise such crops as require the least moisture for their successful growth. (4) Sometimes it is best to grow a crop only once in two years, keeping the soil cultivated and fallow in the meantime so as to secure for the use of the plants as much as possible of the two years' rainfall.

Review.—1. What two states lead in sheep raising? 2. What other states raise many sheep? 3. Describe the keeping of sheep in the Plateau region. 4. Name and locate a sheep market in Montana. 5. Name the three chief sheep-raising countries of the world in order of their importance in this industry.

6. Name three countries in which irrigation is practiced. 7. When and by whom was irrigation introduced into Utah?

8. Describe the method of bringing the water to the fields.

9. What is the Reclamation Service? When was it organized? 10. Explain the financial plan of government reclamation work. 11. What use is made of the waters of the Gunnison River?

12. What crops are raised by means of irrigation in Montana and Idaho? In Colorado? In Arizona?

13. What effects has irrigation upon the manner of living of the people?

14. What is dry farming? How is it done?

MINING

234. Ores. — The Plateau States form one of the great mining regions of the world. The most important metals found in them are gold, silver, copper, lead, and zinc. These metals are usually mixed or combined with other minerals, and the whole mass in which a metal occurs is called an *ore*.

235. Precious Metals.—Gold and silver are called the precious metals because small amounts of them have a high value. They are used in making coins, ornaments, and many artistic as well as useful things. These metals are most commonly found in mountain regions. The reason for this is that the rocks in such regions have been folded, cracked, or crushed, and sometimes heated. In some places the metals have been dissolved by water in the rocks and deposited in pockets and cracks along with other substances, thus making *mineral veins*, composed of ore.

The sides and tops of mountains have been worn away by frosts, glaciers, and streams. Where the rocks contain veins of gold ore, these also have been worn away, and particles of gold are mingled with the sand and gravel which are carried down the mountain and deposited by streams. Such gold-bearing earth is called a *placer*.

Fig. 252. Sluice mining

236. Mining Methods.—When gold was first found in the placers, the miners put the gravel and sand into a pan with water and shook the pan. In this process of *placer mining* the particles of gold sink to the bottom, because they are many times heavier than the rest of the material. The miner can therefore gather them from the bottom of the pan. Pieces of considerable size, called nuggets, are sometimes found.

In order to secure the gold more rapidly, a powerful stream of water is turned upon a bank of gold-bearing gravel, through a large hose. The gravel is washed through a trough or sluice having crossbars in the bottom (Fig. 252). The gold, being heavy, sinks behind the crossbars and is gathered. When water is thus used on a large scale, the process is called *hydraulic mining*.

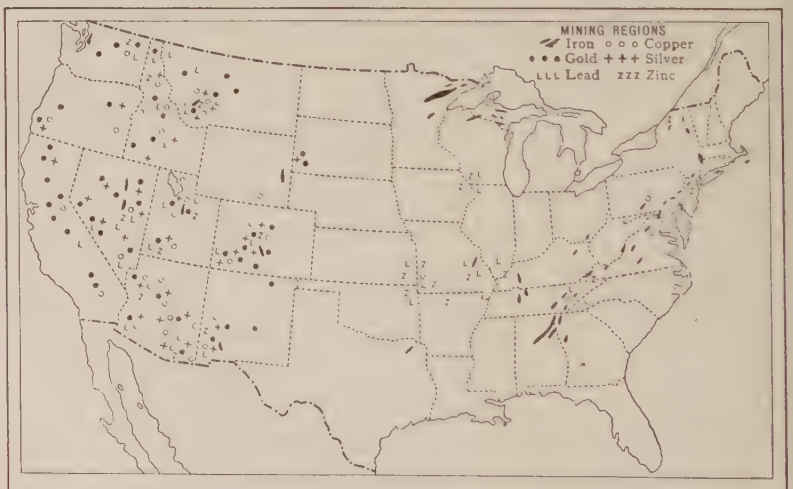


Fig. 253. Principal metal-mining regions of the United States

When metal-bearing rock is found in veins, it is dug out, usually from mines beneath the surface, even at a depth of hundreds or thousands of feet. Shafts are sunk to reach the vein, or tunnels, called *drifts*, are dug into a mountain side. The vein may be several inches or several feet thick, and this is followed and blasted out. In many of the great mines there is a network of shafts and tunnels, with every convenience for drilling, blasting, and hoisting the ore. Pumping is often necessary to keep the mines from being flooded with ground water, and in some mines, as at Virginia City in Nevada, hot water and steam make it difficult to work the mine at all. The roofs of large chambers must be supported by heavy timbers, making large demands on the forests of the neighborhood. The drills may be driven and the mines lighted by electricity.

Fig. 254. The Anaconda mine at Butte

There are various methods of extracting the metals. In some cases the ore is crushed into powder by powerful stamping machinery, and then treated by the aid of various chemical processes to separate the metal. Other ores are put through a blast furnace, and the metals, as in the case of iron, are separated by means of heat. A plant for separating metals in this manner is known as a *smelter*. There are smelters at Leadville, Pueblo, Colorado City, and Denver, in Colorado, at Butte, Great Falls, and Anaconda in Montana, near Salt Lake City in Utah, and at various other places. Some ore is shipped as far east as Omaha to be smelted.

Many of the richest mineral regions are on lands owned by the government. A man who searches for ores is called a prospector. When he is successful in finding a productive spot, he files a claim to it, and thus secures the right to work the claim and enjoy the profits of it.

Rich finds of the precious metals often cause great excitement. Men rush in, it may be by thousands, hoping to gain sudden wealth. Tents are set up, rude cabins are built, mining machinery is brought in, and stores are quickly fitted out with all kinds of supplies. Such a mining camp may in a few months contain as many as ten thousand people. If the locality remains productive for a number of years, substantial buildings are erected, streets are laid out and improved, and the conveniences of modern life are provided for the people. If the supply of ores is very large, or if the place becomes a center of trade for surrounding regions, a permanent city is established. If the ores are exhausted, and the place has no other advantages, it may in a few years be almost abandoned.

237. The Great Metal-mining States.— All the states of the Plateau group produce gold and silver. Montana yields much silver and mines more copper than any other state except Arizona. Butte (Fig. 254), in the western part of the state, is the center of a mining region that has produced more copper than any equal area in the world.

Great quantities of silver and lead are produced in the Cœur d'Alene district in northern Idaho. Much of the trade of this region goes to the important city of Spokane in Washington.

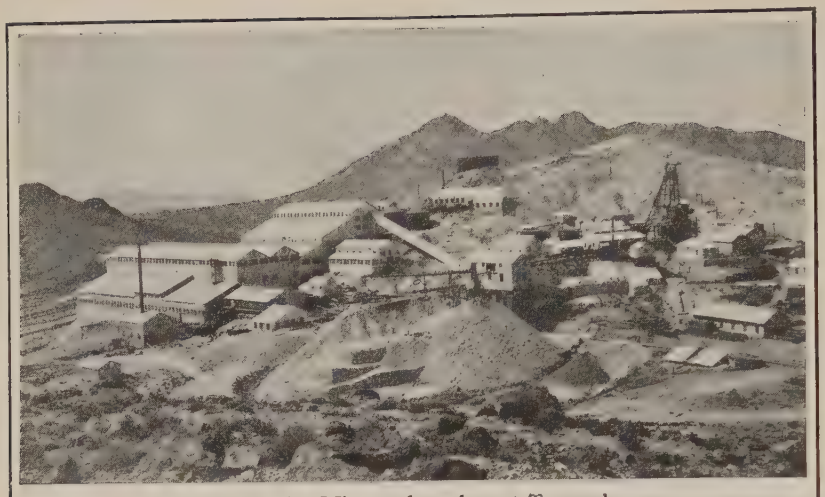


Fig. 255. Mine and smelter at Tonopah

Colorado has large mining sections in various parts of the Rocky Mountains. It produces large amounts of gold, silver, zinc, and lead; it also yields ores from which tungsten, radium, and other metals are obtained. Leadville grew to be a city because of deposits of silver and lead. It is situated in the Arkansas Valley about two miles above sea level. Cripple Creek sprang up as a gold-mining camp, and is now a city of several thousand people. Ouray, Silverton, and Telluride are mining towns in the San Juan Mountains in southwestern Colorado.

Utah has many mines and yields large amounts of copper, silver, lead, and gold. It ranks with Montana, Nevada, and Idaho as one of the great silver-producing states.

Nevada, which is one of the driest of these states and has but little agriculture, is a large producer of precious metals at Goldfield, Tonopah (Fig. 255), and other places. Nevada stands with Colorado, California, South Dakota, and Arizona among the leaders in gold production. It is also one of the great silver-mining states, and produces much copper.

Arizona is the greatest copper-mining state in the Union. Bisbee and Jerome are the principal centers of copper production in this state. There are some copper mines also in New Mexico.

238. Coal and Iron.—Besides the metals already named, the Plateau States have enormous beds of coal. Colorado is the greatest producer of coal, and Wyoming is second. Montana, Utah, and New Mexico also are coal-mining states. Trinidad, Colorado, and Sheridan, Wyoming, are coal-mining centers. Coal is needed in the Plateau States for running the mines and smelters, as well as for railways, factories, and domestic use. Iron ore is found in many places, and is smelted at Pueblo, in Colorado. Much petroleum is produced in Wyoming, and Casper is a great center of this industry.

239. Summary.—At first people were attracted to this region by the discovery of gold and silver; the other mining industries, and the cattle and sheep ranches, were of later development. As the number of people increased, irrigation was encouraged, and agriculture became an important industry. Churches, libraries, schools, and colleges were soon established; as in the North Central group, every state supports a university, and in some cases also a separate college of agriculture and the mechanic arts. A region which seemed barren, and which was once called "the Great American Desert," has been made into a land of wealth, culture, and prosperity.

Review.—1. What is an ore? A mineral vein? 2. Describe placer mining; hydraulic mining. 3. What are some of the processes of extracting metals from the ores?

4. Which three states of this group produce much copper? Name a copper-producing city.

5. Where is the Cœur d'Alene district, and what metals does it produce? 6. Give an account of mining in Colorado. 7. What are the chief mineral products of Utah? Of Nevada?

8. What states in this region mine the most coal?

ROUTES AND CITIES

240. The Earliest Rail Route.—In the ten years from 1850 to 1860 the United States government sent out many surveying parties to find suitable railroad routes from the Mississippi River to the Pacific coast. In 1869 the first railroad was opened to the western coast. This was, in part, the Union Pacific Railroad, which crosses Nebraska and Wyoming to Ogden, Utah, in the center of an agricultural and fruit-growing region. From that place a connecting railroad passes through the Great Basin, and over the Sierra Nevada to San Francisco. On this transcontinental line, in Wyoming, is Cheyenne, the state capital, located in a fine grazing region; and in Nevada is Reno, the largest city and chief trade center of that state. At the foot of the Wasatch Mountains is Salt Lake City, the capital of Utah, the chief city between Denver and the Pacific coast, and one of the great business centers of the West (Fig. 256). From this city connecting lines of the Union Pacific system cross southern Idaho to Portland, Oregon. On this route are Pocatello, with railroad repair shops, and Boise, the capital of Idaho and an important manufacturing and trading center.

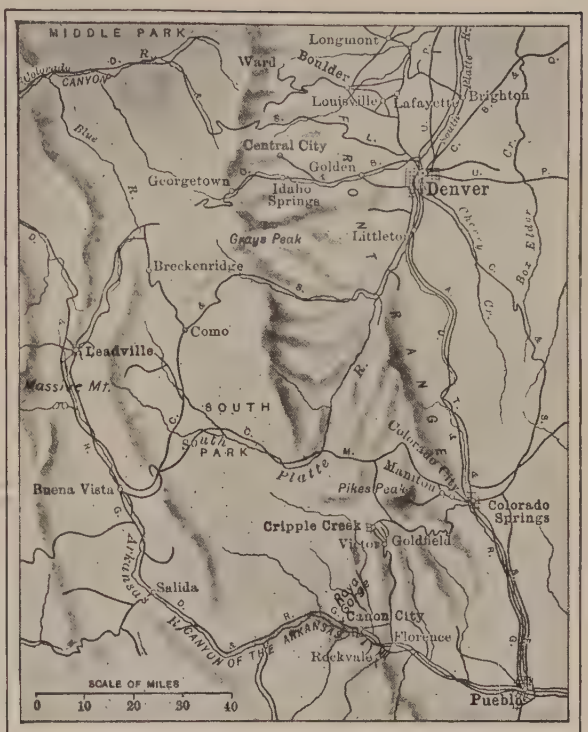


Fig. 257. Denver and surrounding region

241. Northern Routes.—In the states to the north, the Northern Pacific, the Great Northern, and the Chicago Milwaukee and St. Paul railroads pass through the chief cities of North Dakota, South Dakota, Montana, Idaho, and Washington to Seattle and other ports on Puget Sound. These roads get supplies of freight from the grain fields of the plains, the stock ranges of Montana, the mines of Montana and Idaho, and the wheat fields, lumber mills, and orchards of Idaho and Washington.

Fig. 256. A business street in Salt Lake City

Helena is the capital of Montana. It is on the border of a rich farming district, and near many mines. It has large quartz crushers and railroad shops. Much smelting is done at Anaconda and Great Falls. Missoula is the center of a prosperous lumbering, mining, and farming region.

242. Colorado Routes.—Several roads cross the Rocky Mountains in Colorado. The first to be built was the Denver and Rio Grande, which passes from Denver and Pueblo (Fig. 257) through the Royal Gorge and over the continental divide to Salt

Lake City and Ogden. Denver is the capital of Colorado and one of the great cities of the West. It is on the South Platte River, a few miles east of the Rocky Mountains. Many railroads center here from all directions. It has a large wholesale trade with the rich agricultural and mining regions around it, and is the chief live-stock market of this part of the country. In addition it has large smelters, machine shops, flour mills, and meat-packing establishments.

Colorado Springs, near the foot of Pikes Peak, is a health resort and the financial center for Cripple Creek and other mining places. Pueblo, on the Arkansas River, has smelters for iron, silver, and lead, and is the second city of the state. The University of Colorado is at Boulder.

243. Southern Routes. — The Atchison Topeka and Santa Fe Railway and the Southern Pacific cross New Mexico and Arizona, and reach Los Angeles and San Francisco in California. In the northern part of New Mexico is Santa Fe, the capital of the state. This is one of the ancient Spanish settlements, as its name indicates. It was founded by a Spanish pioneer in 1605. Many of the homes are of *adobe*, or sun-dried brick, and some of the people still speak the Spanish language. One of the historic routes from Missouri to the West is known as the old Santa Fe trail. The largest city of New Mexico is Albuquerque, a health resort and railway center, with stockyards, large railroad shops, and lumber mills.

In Arizona, Tucson and Phoenix, the capital, are centers of beautiful farming and grazing regions. The region around Phoenix is irrigated with the water stored in reservoirs on Salt River.

Review by States.—Montana (Mont.). 1. Describe the drainage of this state. 2. What is the latitude of its northern boundary? 3. What livestock industry is important in Montana? 4. What mountains extend through the western part of this state? 5. Name and locate the capital. Locate Butte, Billings, and Great Falls. 6. What transcontinental railroads cross Montana? 7. What is the density of population of this state (Fig. 80)? How does this compare with Colorado? Nevada? Missouri?

Idaho. 8. Name the states on the boundary of Idaho. 9. Locate the Spokane River; the Salmon River; the Snake River. 10. Which of these rivers has cut deep canyons? 11. What important mining region is in this state? 12. What is the trading center for this mining region? 13. Name and locate the capital.

Wyoming (Wyo.). 14. Describe the boundaries of Wyoming. 15. Where is the Yellowstone National Park? 16. Which parts of Wyoming are in the Missouri basin? 17. Name and locate the capital; locate Sheridan. 18. What useful mineral is extensively mined in Wyoming? 19. What railroad crosses Wyoming?

Colorado (Colo.). 20. Name and locate the capital of Colorado; in what ways is it important? 21. Make a drainage map of the state, and on it locate seven cities. 22. What are the chief products of Colorado? 23. Locate Pueblo, and name an important industry of that place. 24. Name and locate an important health resort in this state. 25. Locate Boulder, Cripple Creek, and Trinidad.

Utah. 26. Who first settled Utah? 27. What mountains furnish water for irrigation? 28. What is the principal lake and why is it salt? 29. What transcontinental railroad was first completed? When? What city of Utah is on this line? 30. Name and describe the capital. 31. What great river crosses the state? What river from Wyoming joins it? 32. What states border Utah?

Nevada (Nev.). 33. Describe the rainfall of Nevada. 34. What mountain range is west of the state? 35. What is the chief river of Nevada? 36. Why does it not reach the sea? 37. What river borders Nevada on the southeast? 38. What metals are mined in large quantities in Nevada? 39. Name and locate the capital; the chief city.

New Mexico (N. Mex.). 40. Bound New Mexico. 41. What river crosses it? 42. Name and locate the capital. Give an account of its history. 43. Name and locate the largest city. 44. What great railroads cross the state?

Arizona (Ariz.). 45. What great river crosses the northern part of Arizona? 46. What river crosses southern Arizona? 47. Name and locate the capital. 48. Describe the climate of Arizona. 49. What are the chief products of the state? 50. Locate Bisbee and Tucson.

THE PACIFIC STATES

244. Discovery and Settlement.—Before there were colonies in Massachusetts or Virginia the western coast had been visited by several Spanish explorers, and by Sir Francis Drake, the great English navigator of Queen Elizabeth's time. These early voyages were in the sixteenth century. Not much, however, was known concerning this region until about the time of the American Revolution. Then Spanish priests from Mexico established missions at San Diego and elsewhere along the coast of California, and converted the Indians to Christianity. Many of the old Spanish churches are still standing or have been restored.

Fig. 258. The water front and business section of Seattle, one of the large cities of the Pacific coast

In 1792 Vancouver sailed along the coast; the island at the opening of Puget Sound bears his name. In the same year Captain Robert Gray of Boston, commanding the *Columbia*, after much difficulty, sailed against the current into a great river, and gave to it the name of his ship. It was not long after this that Lewis and Clark came across the mountains to the same place (Sec. 217). The development of Oregon and Washington as an agricultural region began with settlements made in 1832.

In 1844 Captain John C. Frémont, a famous American explorer of those days, came overland into California. During the war with Mexico he took part in the American conquest of that region. In 1848 gold was discovered in the river gravels, and in 1849 began a rush of tens of thousands of people from the East.

For a time more than half the people of the Pacific coast were engaged in mining; and later the industries of lumbering and fishing became very important. But most important of all at present is agriculture, for which there is abundance of rain in the great valleys and near the coast, except in the south. In other regions irrigation and dry farming are very successful. Commerce and manufacturing have developed, large cities have grown up, and the Pacific States have become one of the most prosperous parts of our country.

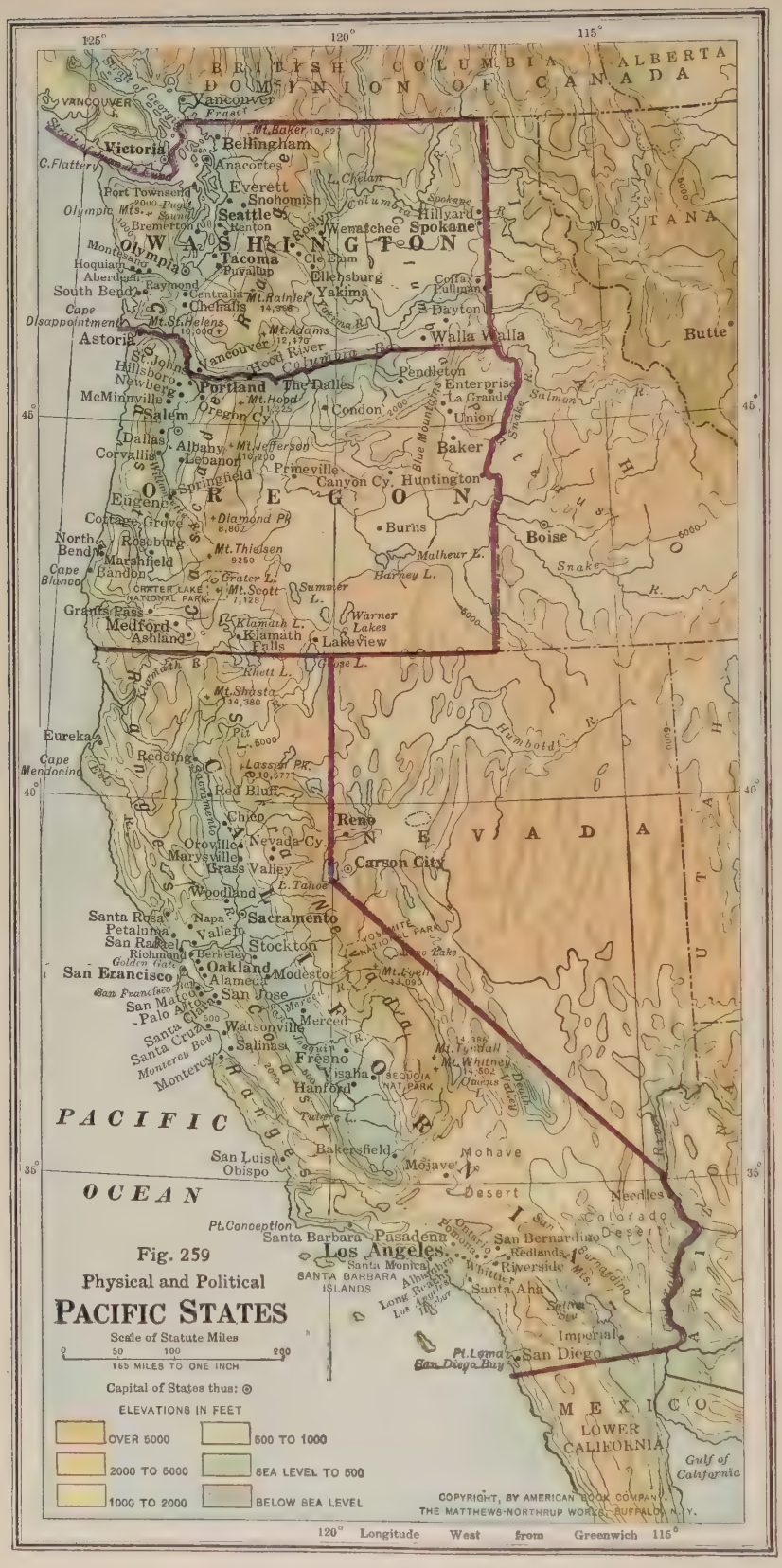


Fig. 259

Physical and Political

PACIFIC STATES

THE PACIFIC STATES

	Area, Sq. Mi.	Population, 1920
Washington	69,127	1,356,621
Oregon	96,699	783,389
California	158,297	3,426,861

Map Study.—1. How far apart are the northern and southern boundaries of California, allowing 69 miles for each degree of latitude? 2. Compare the longitude of San Francisco with that of the city of New York (see map of the United States). 3. Give the position and main direction of the Sierra Nevada. 4. Where is the Yosemite National Park? 5. Locate Mt. Shasta, Mt. Hood, Mt. Rainier, and Mt. Baker.

6. Where is Point Conception? Cape Mendocino? 7. What important bay indents the Pacific coast of the United States? 8. Trace the course of the Columbia River. 9. What mountain ranges border the Pacific coast? 10. What large island is at the opening of Puget Sound? 11. Compare the Atlantic and Pacific coast lines of the United States. 12. What group of islands lies off the coast of California?

13. Name and locate the chief city of southern California; the chief seaport of central California. 14. Describe the location of Portland in Oregon; Seattle and Spokane in Washington. 15. What important cities in western Canada may be reached by a short voyage from the city of Seattle?

Fig. 260. Lassen Peak in eruption

DESCRIPTION OF THE REGION

245. The Sierra Nevada.—Of the three states in the Pacific group California is the largest, and has the highest mountains. The Sierra Nevada, named by the early Spanish settlers from a range in southern Spain, extends nearly north and south through eastern California. This name means *snowy range*. Much of the Sierra has an altitude of 13,000 feet, or almost two and one half miles. Mt. Whitney rises to 14,502 feet, — the highest elevation in the United States (exclusive of Alaska), — and other peaks are nearly as high. Lassen Peak is the only active volcano in the main part of our country (Fig. 260). Farther north is Mt. Shasta (Fig. 69), a volcanic cone almost as high as Mt. Whitney. On Mt. Shasta and on other high slopes of these mountains are several glaciers and many fields of perpetual snow. The range has a gentle slope toward the west, but is steep on the east, where it overlooks the Great Basin in Nevada. The lower western slopes of these mountains are covered by forests or have been cleared to form fertile fields; but the upper slopes are above the timber line, and consist of bare rocks and rock waste.

246. Cascade Range.—The same mountain range continues northward through Oregon and Washington, but in those states it is called the Cascade Range. It is not so high as the Sierra Nevada, but is broader and is covered with great forests. Above it rise several volcanic cones, to the region of glaciers and perpetual snow. Seen in the sunlight they are like bright jewels rising above the setting of the dark green forest. Among these peaks are Mt. Hood in Oregon, and Mt. Rainier and Mt. Baker in Washington. Mt. Rainier is 14,363 feet in altitude, and is one of the noblest mountain peaks in the United States (Fig. 261).

247. The Great Valleys.—West of the Sierra Nevada and Cascade Range is a series of wide, open valleys, with a fertile soil and a large population. One of these is the Great Valley of central California, shut in by the Sierra Nevada on the east and the

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Fig. 261. Mt. Rainier. Observe the reflection in the water

Fig. 262. Coast Range, southern California. The men in the foreground are piling beans

Coast Ranges on the west (Fig. 262). It is four hundred miles long and fifty miles wide. The southern part is drained by the San Joaquin River, which flows northwest. The northern part is drained by the Sacramento River, which flows southward. Both rivers receive many tributaries, and they unite before entering San Francisco Bay. The bay connects with the ocean through the Golden Gate, a break in the Coast Ranges (Fig. 263). The eastern tributaries of both rivers are fed by the rains and melting snows of the Sierra Nevada. Many of them are small during the dry season. The western tributaries, coming from the eastern slope of the Coast Ranges, are much less important. This slope gets but little rain. For this reason it is scantily covered with forest, and none of its streams reach the trunk rivers in the valley during all of the dry season.

West of the Cascade Range in Oregon is the fertile Willamette Valley, a region about the size of Massachusetts. Through this valley the Willamette River flows northward and joins the Columbia River. On the Willamette, a short distance from its mouth, is the city of Portland. West of the Cascade Range in Washington is a broad, fertile valley whose northern part is deeply indented by Puget Sound.

Fig. 263. The Golden Gate

248. Coast Ranges.—Like the Sierra Nevada and Cascade Range, the Coast Ranges extend north and south through the three states. The northern Coast Range in Washington, between Puget Sound and the ocean, is known as the Olympic Mountains. The Coast Ranges are rugged in many places, but are much lower than the Sierra Nevada.

249. Columbia Plateaus.—East of the Cascade Range in Oregon and Washington is a plateau country, often called the Columbia Plateaus. The region lies along the Columbia River in Washington, and extends through Oregon southward. Spokane is the principal city of the Columbia Plateaus. Over much of this region the surface rocks are of lava. The lava was poured out, in a fluid state, from many ancient volcanoes or from long fissures or breaks in the earth's crust. It was so abundant that it covered thousands of square miles to a depth of hundreds of feet. Weathering has changed the surface lavas into soil. The canyons of the Columbia and Snake rivers are cut across these lava fields.

250. Yosemite Valley and Crater Lake.—The Yosemite Valley is a deep canyon in the Sierra Nevada (Fig. 264). The Merced River and some of its branches enter the canyon by falls from 300 to 1600 feet high. The Yosemite is as well known, though not so large, as the Grand Canyon of the Colorado.

U. S. Dept. of Ag., Forest Service

Fig. 264. Yosemite Valley, California

In the heart of a low, broad, volcanic mountain in the Cascade Range is a pit six miles across and 4000 feet deep, half filled with water, called Crater Lake (Fig. 265). The basin was formed by the sinking of the central part of the mountain. This place, like the Yosemite Valley, has been reserved by the government as a national park.

251. Climate.—The climate of this region shows sharp contrasts (Secs. 25–27), the climate of western Washington being temperate, while that of Death Valley and some other parts of California is marked by great heat. In each state the temperature of the great valleys is moderate, while the high mountains show Arctic conditions of frost, snow, and ice. All the lowlands that lie near the Pacific Ocean have a mild climate, being cooled in summer and warmed in winter by the prevailing westerly winds blowing from the sea.

There are also great contrasts in rainfall in this region. Here are the wettest, and some of the driest, lands in the United States. Except in high mountains, the winter season is wet rather than snowy, and the summers are dry,—so dry, on some of the lowlands, that bags of wheat and trays of fruit can be left out of doors for many weeks without injury from moisture.

The average annual rainfall in western Washington is about 65 inches. In some parts of the mountains it is even more than this, and is the heaviest in the United States. Eastern Washington, on the other hand, is east of the mountains and has but about 20 inches of rainfall. Oregon shows a like difference between its western and its eastern parts. Northern California, and the high mountains toward the south, have plentiful rains, while the southern parts of the Great Valley are so dry as to need irrigation, and parts of southeastern California are among the driest of deserts. The range of rainfall in the state is from 3 inches in some southern parts to 80 inches in the mountains of the northwest (Fig. 72).

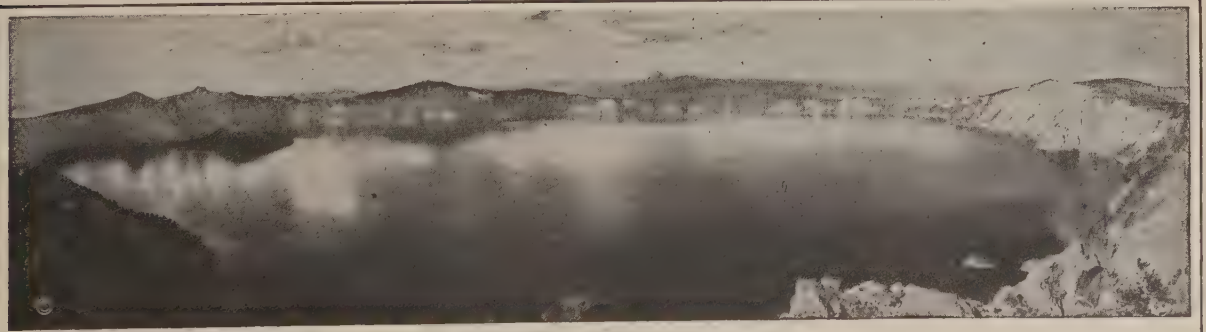

Fig. 265. Crater Lake, Oregon

Review.—1. Which is the largest state in the Pacific group? 2. How does it compare in size with your own state? 3. Where is the principal mountain range in the Pacific States? What names has it? 4. Where are the great valleys of the three Pacific States? 5. What rivers drain the Great Valley of California? 6. What river drains the great valley in Oregon? 7. Locate and describe the Columbia Plateaus. 8. Describe the Yosemite Valley. 9. What is Crater Lake? 10. Compare the rainfall of eastern and of western Washington; of northwestern and of southeastern California (Fig. 72). 11. Explain the differences observed. 12. Where are the wettest and the driest parts of Oregon? Why?

Fig. 266. A header—combined harvester and thresher

INDUSTRIES

252. Agriculture.—The leading industry of the Pacific States is agriculture. In the Puget Sound and Willamette valleys and in the northern part of the Great Valley of California, rainfall is sufficient for crops. Even where the rainfall is scanty, as is the case in much of eastern Washington, eastern Oregon, and the southern and south-central parts of California, dry farming (Sec. 233) may be practiced or irrigation works may be constructed to bring the water of the mountain streams to the fertile lands of the valleys.

In the early days of the agricultural development of these states wheat was a leading crop, and it is still an important crop in eastern Washington and Oregon. As the great wheat districts of these two states are east of the Cascade Range they are largely in a region of small rainfall (Fig. 72) where dry farming or irrigation is necessary. The soils are fertile, however, and large crops of this cereal are grown. The grain cures while standing, so that combined harvesters and threshing machines are used (Fig. 266). Washington has become, in recent years, one of the great wheat-growing states of our country. In California the large wheat farms of a few years ago have disappeared. They have been divided into smaller farms which are more carefully cultivated and on which products in great variety are now raised.

In the plateau section of central Washington and Oregon there are several valleys in which irrigation has made possible the raising of all temperate-latitude fruits and vegetables. One of the most productive is the Yakima Valley in Washington, known for its wonderful orchards (Fig. 267) and hop yards. Still farther west is the great valley between the Cascade Mountains and the Coast Ranges. This includes the Willamette Valley of Oregon, a most prosperous agricultural region. In many parts of the great valley the land has high value, the farms are small, and fruits and garden crops are raised. Some agriculture also is carried on in the valleys of the west slope of the Coast Ranges.

Fig. 267. Packing apples, Washington

The recent agricultural development of California has been in the raising of fruits, vegetables, and

nuts. It is now the greatest fruit state in the Union. It is best known for fruits of warm climates, such as oranges and lemons, but three fourths of all its fruit crop is in fruits of temperate latitudes, such as apples, peaches, apricots, and pears. California surpasses all other states in raising grapes, from which grape juice and raisins are made. In recent years California has become even more important than Spain as a raisin-producing region. Many of the vineyards are in the valley of the San Joaquin River, in the southern part of the Sacramento River valley, and in the district north of San Francisco Bay. The region around Fresno is the great raisin district. The orange groves are chiefly in the southern half of California (Fig. 268). Many of the mountain streams, when they reach the plains, are turned into irrigation canals and distributed over the fields. Here in a region once given over to herds of cattle and great wheat farms, there are now flourishing cities and villages, and a large and prosperous population. In addition to the products already named, sugar beets, sweet potatoes, almonds, walnuts, melons, rice, cotton, olives, and figs are raised in abundance.

Fig. 268. Orange grove in southern California

In the semi-arid regions of eastern Washington and Oregon and in the dry plains and mountain pasture lands of California there are many stock ranches, and cattle and sheep raising are important industries. On many of the farms of the great valleys dairy cattle are kept, and the milk, butter, and cheese produced find a ready market. Poultry raising is increasing in importance, especially on the farms in the great valleys and in the neighborhood of the larger cities.

253. **Forests and Lumbering.**—One of the largest and most important of the lumbering regions of the United States is in the three states of the Pacific coast. The great forests there are in part due to the heavy rainfall (Sec. 251). Both Oregon and Washington have an enormous amount of timber still standing, and Washington cuts more lumber than any other state of the Union. The manufacture of lumber products is carried on at Seattle, Tacoma (Fig. 269), Everett, Bellingham, and other Puget Sound ports, and at Portland. From these places some of the lumber is sent to such distant points as Alaska, Hawaii, Japan, China, Australia, and South America. As the lumbermen do not depend upon snow on which to sled the logs, the work can be carried on at all seasons.

Several kinds of trees, unknown in other parts of our country, grow to heights of 200

U. S. Dept. of Ag., Forest Service

Fig. 269. Lumber mill at Tacoma

or 300 feet, and many have diameters of ten, twenty, or even thirty feet. Among the greatest are the "big trees" (Fig. 270), a species of sequoia that grows on the slopes of the Sierra Nevada and Coast Ranges in California. Both the nation and the state have set apart reserves containing the big trees in order to save them from the lumberman and from destruction by fire. Some of these trees are believed to be at least four thousand years old. In the Coast Ranges of northwestern California, there are extensive forests of the very large trees called redwoods (Fig. 271).

In the Cascade Range and the Olympic Mountains of Oregon and Washington are found spruce, pine, hemlock, and cedar trees. The Douglas fir, however, is the most common, and the greatest producer of lumber. This tree is found also in abundance in the mountains of British Columbia, and to a less degree in the Rocky Mountains. Besides the foreign markets, the growing cities and many mines of the Pacific States furnish a large market.

To prevent careless lumbering and destructive fires, the national government has within a few years set apart vast tracts, as national forests, in the Sierra Nevada, the Cascade Range, and the Coast Ranges of the three states (Sec. 224).

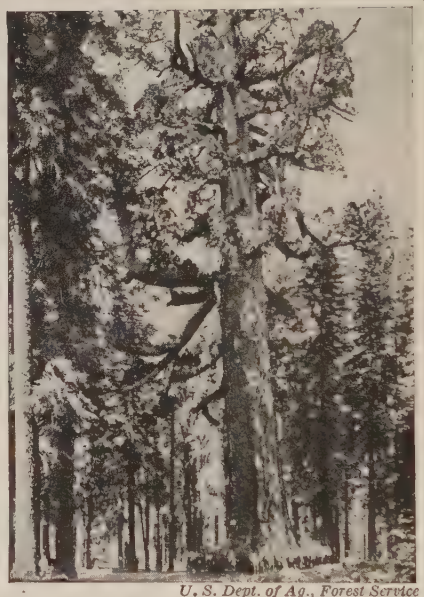

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Fig. 270. Grizzly Giant: 91 feet in girth, and about 400 feet high

254. Fisheries.—Hundreds of miles from the ocean, along the headwaters of the Columbia River, and of the Fraser River, in British Columbia, one may see the salmon as they head up the stream. They live in salt water, and every year, at the spawning season, the full-grown salmon swim up the rivers into fresh waters. In the mountain streams the young salmon are hatched, and swim down to the ocean to make their growth. After about four years they are mature; then they move up the rivers to spawn, and vast numbers are caught on the way. When Lewis and Clark and other explorers came to the region, they found the Indians living mainly on these fish. Now for many years the white man has made a business of catching and canning them (Fig. 272), and salmon from the Columbia River or from Puget Sound are seen in every provision store. In air-tight cans, the fish can be kept a long time. Fresh salmon also are shipped long distances in refrigerator cars.

Fig. 271. Redwood logs on the way to the mill

U. S. Dept. of Ag., Forest Service

One of the canning centers is Astoria, a small city in Oregon at the mouth of the Columbia River. This city was named for John Jacob Astor, the ancestor of a well-known family, because he made the place a depot for the fur trade of the Northwest, in which he was for a long time engaged. The fur trade has now become comparatively unimportant, and the fishing industry has taken its place. Canning is also done at Bellingham and elsewhere on Puget Sound. This industry is important also along the shores of British Columbia and southern Alaska.

Fig. 272. Salmon canning factory, Astoria

The state governments restrict fishing so that many fish can escape the nets and other fishing apparatus, and make their way up to the spawning grounds. Otherwise a valuable industry would in a few years be destroyed. Artificial hatcheries are established, to stock the rivers with young salmon, which will go down to the salt water to grow.

Tuna, halibut, crabs, and oysters are taken along the Pacific coast.

255. Mining.—Much that is said about mining in regard to the Plateau States (Sec. 236) is true for this region also. The first great incentive to mining in the West was the discovery of gold in California in 1848. Ever since then California has been a great producer of this metal, and it now ranks first among the states. There is not so much placer mining as formerly, but the parent veins in the mountains are worked, and the gold is separated by crushing and other processes. California produces also much of the liquid metal called quicksilver or mercury. All the Pacific States are producers of gold, silver, lead, and copper.

One of the largest smelters is at Tacoma, Washington, where silver, gold, lead, and copper ores are treated. A part of the ore smelted in this and other Puget Sound smelters comes from Alaska, Asia, and South America. There are smelters also in eastern Washington and in California.

Washington is the chief Pacific state in the production of coal (Fig. 127). California is one of the leading states of the country in petroleum. The largest oil wells are in southern California in the region about Bakersfield. California has little coal, and petroleum is used as fuel in the railway engines and steamships, and in heating plants in the cities. The desert areas of southeastern California yield salt, soda, and borax.

Review. — 1. Which of the Pacific States raises much wheat? 2. Where are the wheat regions of Washington and Oregon? 3. What farming methods are employed in these regions? 4. Why does California raise less wheat than it once did? 5. What crops are now taking its place? 6. Where is the Yakima Valley? For what is it noted? 7. What are the industries of the great valleys in Washington and Oregon? 8. How does California rank as a fruit-growing state? 9. What fruits are grown in large quantities? 10. Where are the cattle and sheep ranches? Where are the dairying districts?

11. How does Washington rank as a lumbering state? 12. Where is lumber manufactured, and to what foreign countries is it exported? 13. Where are the "big trees" found?

14. Describe the habits of the salmon. 15. Where are they caught, and in what stage of their life history? 16. How are they prepared for market? 17. How is the fishing industry controlled, and how are the rivers stocked?

18. Of what metals is California the principal producer in this country? 19. Where are the chief California oil wells? 20. Where is coal found in the Pacific region?

MANUFACTURING AND COMMERCE

256. Manufacturing and Commercial Advantages. — Manufacturing is developing rapidly in the Pacific States. Already it stands next to agriculture in importance. To a remarkable extent the other industries already studied furnish the raw materials for the leading manufactures, which include: (1) the cutting of timber and its manufacture into boards, shingles, boxes, and furniture; (2) the manufacture of flour; (3) slaughtering and meat packing; (4) the canning of fish, fruit, and vegetables; (5) the refining of petroleum; (6) the manufacture of butter, cheese, and condensed milk; and (7) the smelting of ores. The manufacture of lumber and lumber products is highest in value in all three states. The manufacture of flour is carried on in Portland, Seattle, and Tacoma, from which points it can easily be shipped to Pacific coast, South American, or Asiatic markets. Some flour is made at Spokane,

Fig. 273. San Francisco and vicinity

Fig. 274. Union Square, San Francisco

a trading center in the wheat-growing region of eastern Washington. The falls in the Spokane River at this point are capable of furnishing an enormous amount of power.

The manufactures of the Pacific States have been stimulated by their commercial advantages. Railroads have been built through the great farming and mining regions, and they bring the products of the fields and mines to the cities. The transcontinental railroads carry many trainloads of fresh fruit across the mountains to eastern markets every year. The fine harbors of the greater seaports are easily reached from the ocean, and to them come ships from China, Japan, and many other distant lands. Commerce with our Pacific possessions — Alaska, Hawaii, and the Philippines — is increasing, as it is also with Australia, New Zealand, and the South American and Asiatic countries. The Panama Canal has increased the water traffic with New York and other Atlantic ports, and also with European countries.

257. Cities.—San Francisco stands upon a peninsula between the Pacific Ocean and San Francisco Bay. Its harbor is reached through the Golden Gate. The wharves and business streets of the city are on the east side, toward the bay, while the residence part is on the ocean side. San Francisco Bay and the Golden Gate furnish the natural outlet for the Great Valley of California,

Fig. 275. Drying moving picture films, Los Angeles

and this has helped to make the city the leading industrial and commercial center of the state. Several transcontinental railroads connect San Francisco with the Plateau States and with the central and eastern parts of the United States. The harbor is one of the best in North America (Fig. 273), and the foreign trade is large, especially with countries bordering the Pacific Ocean.

Oakland is east of San Francisco, across the bay, and is the terminus of the railroads from the East. Alameda and Berkeley are also on the east shore of San Francisco Bay, near Oakland. At Berkeley is the University of California, one of the largest in the country; and at Palo Alto, south of the bay, is Leland Stanford Junior University. San Jose also is in this part of the state.

Sacramento, on the Sacramento River, is the capital of California. It is one of the oldest cities of the state, is at the head of navigation for large boats, and is a market for fruit. Stockton is at the head of navigation on the San Joaquin River, and is also a market for fruit as well as for grain and flour.

Los Angeles is the largest city in the state, though it has fewer people than the metropolitan region of San Francisco, including with that city Oakland and other suburbs. It is the center of a great fruit region and the seat of the University of Southern California. Los Angeles is a center for the moving picture industry (Fig. 275) and has much trade with Pasadena, Long Beach, Santa Barbara, and other places of resort. Water for city supplies and for irrigation is brought from a distance of 240 miles. The city extends to the coast (Figs. 47, 57), where a great harbor has been constructed to handle the growing commerce. Its construction was an expensive work, but it was necessary because there was no large and safe natural harbor on this part of the coast.

California has few harbors, for the coast line is little broken. In the far south is San Diego, with a splendid harbor, important fisheries, and canning establishments. Its uniform and attractive climate makes it a great health resort.

If you should sail up the Columbia River and turn southward up the Willamette River, at about 100 miles from the ocean you would come to Portland, the chief city of Oregon (Fig. 276), which ranks with San Francisco, Los Angeles, and Seattle as one of the great cities of the Pacific coast. The water is deep enough for ocean ships, and hence Portland is both a seaport and a river port, like New Orleans. It is the outlet of the rich farm and fruit country of the Willamette Valley and is the chief market and manufacturing center of the state of Oregon.

Fig. 276. Portland, with Mt. Hood in the distance

Live stock, poultry, fruit, potatoes, flour, lumber, and wool are among the principal commodities. Ships connect Portland with Alaska, with the countries of Asia, and with other lands bordering the Pacific Ocean.

To the south, farther up the Willamette, is the state capital, Salem; and still farther on are the Oregon State Agricultural College at Corvallis and the University of Oregon at Eugene.

Seattle is the largest city of Washington and is the seat of the University of Washington. It is the terminus of transcontinental railroad lines, a port for the shipping of the Orient (Fig. 258), and the chief port for the trade with Alaska. It has a large shipbuilding industry. The growth of Seattle has been very rapid. Lumber, coal, grain, and smelting afford most of the industry and trade of the Puget Sound ports — Seattle, Tacoma, Bellingham, and Everett. Spokane (Sec. 256) is the principal city in the eastern part of the state. Walla Walla is in the southeastern wheat district, and Yakima is the largest city in the central part of the state.

Fig. 277. Puget Sound and vicinity

Review by States.— California (Cal.). 1. Describe the Great Valley, its surface, boundaries, and drainage. 2. Compare the rainfall of the northwestern and of the southeastern parts of the state. 3. What kinds of large trees are found in California? What measures have been taken to preserve them? 4. Name and locate the capital. 5. What waters does the Golden Gate join? 6. What conditions favor the growth of San Francisco? 7. Where is Oakland? 8. Give all the facts you can about Los Angeles; about San Diego. 9. What are the mineral products of California? 10. What fruits of temperate latitudes are raised here? What fruits that are characteristic of warm regions? 11. Where is Death Valley? 12. Give the boundaries of California. 13. Draw from memory a map of California, showing the chief mountains and rivers, San Francisco, Oakland, Sacramento, Los Angeles, and San Diego.

Oregon. 14. What river is on the northern boundary of Oregon? 15. What river is on the eastern border? 16. What states are on the southern boundary? 17. What important valley is west of the Cascade Range? 18. What is the capital? Give location. 19. What is the principal city? What products give it commercial importance? 20. Where is Mt. Hood? 21. Describe the rainfall of Oregon.

Washington (Wash.). 22. Where is Cape Flattery? The Strait of Juan de Fuca? 23. What is the capital? Give location. 24. What is the chief city? 25. What conditions have given it rapid growth? 26. What other important ports are on Puget Sound? 27. Where is Spokane? Walla Walla? 28. Give location and altitude of Mt. Rainier. 29. What mineral fuel is found in the state? 30. What grain is raised in eastern Washington? 31. What fruit is raised in the Yakima Valley? 32. What is the most important tree for lumber in this state? 33. How does the density of population (Fig. 80) compare with that of your own state?

Fig. 278. A government railroad in Alaska

OUTLYING POSSESSIONS OF THE UNITED STATES

	Area, Sq. Mi.	Population, 1920	Capital
Alaska	590,884	55,036	Juneau
Canal Zone	527	22,858	
Porto Rico	3,435	1,299,809	San Juan
Virgin Islands of U. S.	132	26,051	St. Thomas
Hawaiian Islands	6,449	255,912	Honolulu
Philippine Islands	115,026	10,350,640	Manila
Guam	210	13,275	Agaña
Tutuila, etc.	77	8,056	

ALASKA

258. History.—Alaska was at first a Russian possession, but in 1867 William H. Seward, then Secretary of State, arranged a treaty by which this country bought it for $7,200,000. Although regarded at the time as a waste of money, the purchase has proved to be a good investment. Products many hundreds of millions of dollars in value have been taken from Alaska, and its exports to the United States have amounted to as much as $70,000,000 in a single year.

A complete code of laws for Alaska was enacted by Congress in 1899. It is now an organized territory; that is, it elects a legislature of its own, and has a delegate in Congress. In 1909 the importance of the territory was recognized by an exhibition of its resources held at Seattle, and called the Alaska-Yukon-Pacific Exposition.

259. Physical Features.—Alaska has nearly 600,000 square miles and is more than twelve times as large as the state of New York. Its southern end is in about the same lati-

160° Longitude 165° East 170° from 175° Greenwich 180 Longitude 175° West 170° from 165° Greenwich 160° 155° 150° 145° 140° 135° 130° 125° 120°
ARCTIC OCEAN
Beaufort Sea
Mackenzie Bay
Arctic Circle
ASIA
Siberia
Gulf of Anadir
BERING SEA
PACIFIC OCEAN
Gulf of Alaska
DOMINION OF CANADA
YUKON TERRITORY
BRITISH COLUMBIA
ALEXANDER ARCHIPELAGO
ALEUTIAN ISLANDS
WRANGELL I.
HERALD I.
Pt. Barrow
Barrow
Franklin Pt.
Icy Cape
Arctic Circle
C. Lisburne
Pt. Hope
Carwin's Coal Mine
Mt. Kelly
DeLong Mts.
Baird Mts.
Kotzebue
Kotzebue Sound
C. Deshnef
DIOMEDE IS.
Bering Strait
Gulf of Anadir
Seward Peninsula
Candle
Port Clarence
Teller
Council
Bluff
Nome
C. Nome
Rocky Pt.
C. Darby
Norton Sound
ST. LAWRENCE I.
C. Prince of Wales
STUART
St. Michael
Unalakleet
Nulato
Kaltag
Andreafski
Iditarod
C. Romanzof
Yukon
C. Vancouver
NELSON I.
Bethel
NUNIVAK I.
Kuskokwim Bay
Nushagak
C. Nuwenhuim
HAGEMEISTER I.
C. Constantine
Bristol Bay
PRIBILOF ISLANDS
Katmai Vol.
Chughik
Dutch Harbor
UNIMAK I.
SHUMAGIN IS.
ATTU I.
NEAR ISLANDS
RAT ISLANDS
ANDREANOF ISLANDS
ISLANDS OF THE FOUR MOUNTAINS
Kotzebue
Koyuk R.
Koyukuk R.
Yukon Hills
Ft. Gibbon
Betties
Ft. Yukon
Ft. Hamlin
Rampart
Circle
Fairbanks
Eagle
Fortymile
Dawson
Klondike
McCarty
Chena
Tanana
Hot Springs
Tanana Crossing
Selkirk
Yukon R.
Pelly R.
Macmillan R.
Stewart R.
Mackenzie R.
Ft. McPherson
Great Bear Lake
Arctic Circle
Porcupine R.
Sheenjek R.
Coleen R.
Chandalar R.
Koyukuk R.
Kobuk R.
Noatak R.
Kowak R.
Alatna R.
Hogatza R.
Tozitna R.
Melozitna R.
Tolovana R.
Kantishna R.
Toklat R.
Nenana R.
Delta R.
Gerstle R.
Shaviovik R.
Canning R.
Colville R.
Chipp R.
Meade R.
Ikpikpuk R.
Utukok R.
Kukpuk R.
Kowak R.
Selawik L.
Selawik R.
Buckland R.
Kiwalik R.
Noatak R.
Kobuk

Fig. 280. A miner's cabin on the Yukon River in Alaska

tude as northern Germany, and its most northern cape, Point Barrow, is at about latitude 71°, or 300 miles north of the Arctic Circle. At Bering Strait, Cape Prince of Wales is within 40 miles of Siberia. In the southwest the narrow Alaska Peninsula and the Aleutian Islands extend westward more than a thousand miles in a long, bow-shaped curve. The islands are of volcanic origin, and contain a number of active volcanoes. Some small islands have risen above the sea within recent years.

Southern Alaska, bordering the Pacific Ocean, is a region of high and rugged mountains. Middle Alaska, along the Yukon and its branches, is a rolling plain. Northern Alaska, along the Arctic Ocean, is a low and treeless plain.

Many long and deep inlets, or *fiords*, extend from the Pacific Ocean into the mountains of southern Alaska. Of these bays, the largest are Prince William Sound and Cook Inlet. Great glaciers move slowly down the valleys into the sea at the heads and along the sides of the fiords (Fig. 34). Many other glaciers are found farther back in the mountain valleys. There are more than a hundred large glaciers and several thousand of small size in the territory. The mountains are steep and high, and the scenery is, in its grandeur, like that of Norway and Switzerland combined, for it has the fiords of the one and the high mountains of the other. Mt. St. Elias is the loftiest of the mountains near the ocean, and Mt. McKinley, in the interior, is the loftiest peak on the continent, with an altitude of almost four miles.

Central Alaska is crossed by the Yukon River from east to west. This river flows for 1200 miles in Alaska, after leaving the Canadian border (Figs. 14, 280). Dawson, in Canada, is not far from the boundary. The delta of the Yukon is a flat area of 9000 square miles.

Much of northern Alaska is a region in which the ground is always frozen to great depths. The surface part thaws out during the brief summer, and produces a growth of plants. Such regions are called *tundras* and are common on the northern plains of North America, Europe, and Asia. At Nome, on the Seward Peninsula, north of the Yukon delta, the miners found frozen earth 120 feet below the surface.

260. Climate.—Alaska has great variety of climate. Southern Alaska is not very cold, but it has much cloudy weather, and much rain and snow. The warm winds from

the Pacific Ocean are cooled by the mountains and part with their moisture, as on the Pacific coast farther south. In some places 100 feet of snow or even more may fall in a year. This fact accounts for the large number of glaciers. The thermometer has been known to show 87° at Sitka in August, and the lowest temperature recorded there in the winter is 3° below zero. Our northern states all show lower temperatures than this.

Fig. 281. Seals on the Pribilof Islands

At Point Barrow the sun is not visible for about forty days during the winter, and the temperature averages below zero from November to April. On this Arctic shore the rainfall is less than 7 inches. The climate of the interior of Alaska is continental; that is, quite warm in summer, and very cold in winter (Sec. 27).

261. **Mining.**—The chief mineral products of Alaska are copper and gold, and the output of each of these amounts to several million dollars in value each year. The most productive copper mines are located in southern and southeastern Alaska. Gold to the value of $350,000,000 has already been taken from Alaskan mines. Much of it was obtained by placer mining along the streams and in the sands and gravels of the Nome coast lands. Gold is still produced at Nome in spite of the short summers, the great distance of this settlement from manufacturing centers, and its poor landing facilities. Fairbanks, on the Tanana River, and Juneau, the capital, in the southeast, are other important mining centers. The mining near Juneau is in the bed rock, and a great stamp mill is in operation there. Some of the miners spend the long winter in Alaska, but many others leave the territory as winter approaches. There are extensive deposits of coal in Alaska, but little of it is mined. Silver, tin, lead, and petroleum are also found.

262. **Fisheries and Forests.**—The waters of Alaska abound in salmon (Sec. 254), of which there are various kinds. Some of these fish run 1800 miles up the Yukon. There are many canneries, and the export amounts to several million dollars in value each year. There are almost as many plants for salting these fish as for canning. A number of hatcheries have been established to keep the waters well stocked. Cod, halibut, herring, and trout also are caught in these waters.

Alaskan waters are the great field for taking the fur seal (Fig. 281). Stringent laws are now in force to regulate the number of seals to be taken each year, and to prevent slaughtering the mother seals. In spite of restrictions, however, the seals are fewer than formerly, and the skins now have a high value. The Pribilof Islands in Bering Sea are the breeding ground of the seals. Walruses and whales also are taken in the seas about Alaska.

There are extensive forests in many valleys of southern Alaska and along the Yukon and its branches. The trees are, as a rule, not large, and much of the forest will be more useful for wood pulp than for timber. Much lumber is brought in from Puget Sound ports.

263. **Agriculture.**—The country is too far north for extensive agriculture, for the summers are usually too short to ripen grain. Grass is raised and grain is cut green for forage. Potatoes and some other vegetables are successfully grown (Fig. 282). The government has an agricultural experiment station at Sitka. Stock might be kept in considerable numbers. Years ago reindeer

were imported from Siberia, and on account of the similarity of the climates these useful animals have thrived and increased until there are now many large herds in the territory (Fig. 283). The missions of the various churches care for many of these animals, which are used for the benefit of the native people—

Fig. 282. A field of potatoes, Tanana Valley

Indians and Eskimos. While most of the few thousand natives are ignorant, their children are gathered in schools and have begun to learn the ways of civilized life.

264. Transportation.—A good wagon road runs from the seaport Valdez to Fairbanks on a branch of the Yukon River. The United States government has built and operates the principal railroad of Alaska, extending from Seward, on the south coast, 467 miles to Fairbanks. Passengers and freight are thus readily transported to the heart of the territory, and various mining regions are opened to traffic. Another railroad leads from the seaport Skagway to White Horse on the upper Yukon; from there one may travel by steamboat down the Yukon to the sea. Coast steamers run all along the south shore of Alaska, and northward to Seward Peninsula and Nome. Along winter trails, small flags are placed every few hundred feet to guide and save the traveler amid the dreadful storms. Travel is dangerous because the streams are without bridges.

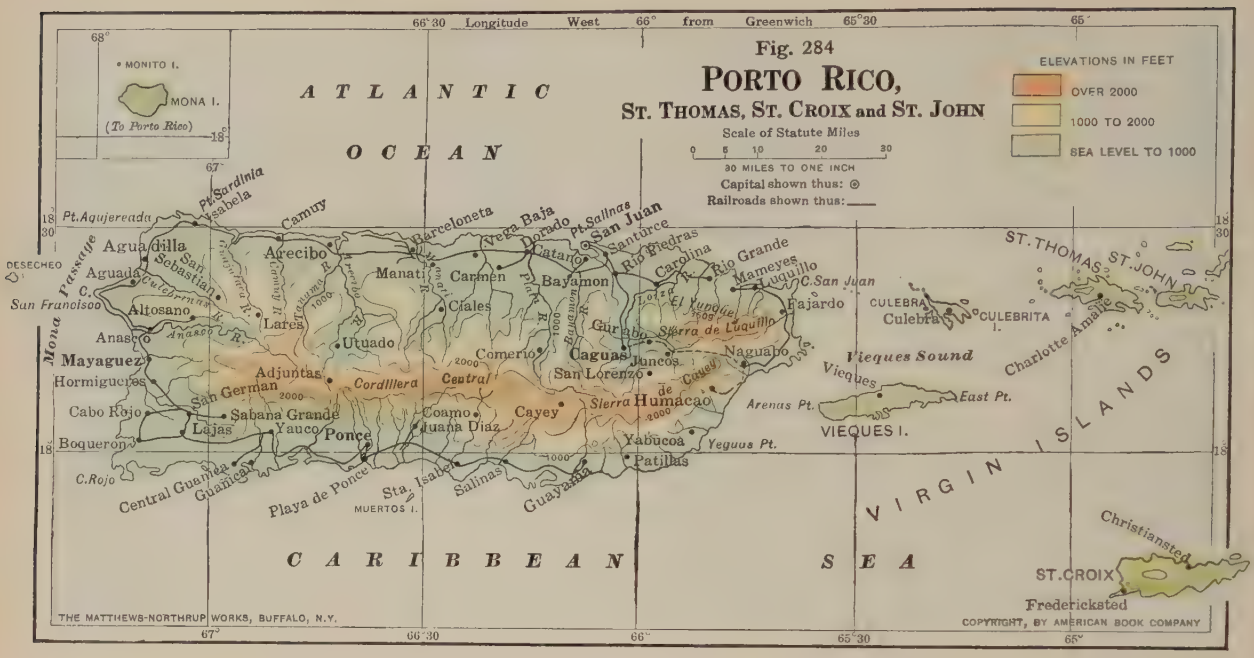
There are several thousand miles of telegraph and telephone lines. A submarine cable connects Alaska with Seattle, and a powerful wireless station is maintained.

Review.—1. Give an account of the purchase of Alaska. 2. What is the area of the territory? 3. Using the map, describe the position of the Aleutian Islands. 4. What large cities in Europe have latitudes similar to those of Juneau or Sitka (Fig. 279 and map of Europe)? 5. What is the most northern point of Alaska? 6. How long is the sun not visible at this place each winter?

7. Describe the shore line of southern Alaska. 8. What is a tundra? 9. What part of Alaska has much tundra? 10. In what part of Alaska are rains and snows heavy? Why? 11. Give an account of the Yukon River, and its delta. 12. Why does Vermont or Minnesota often have much lower winter temperatures than Sitka?

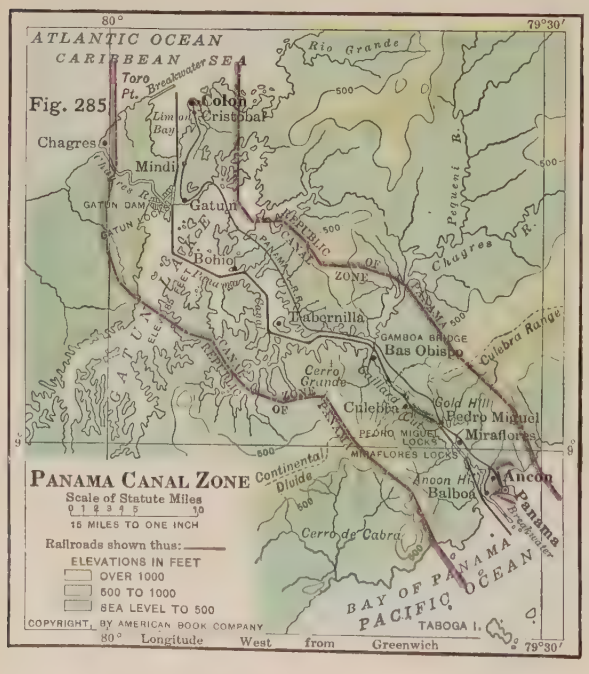
13. What is the chief mineral product of Alaska? 14. Give location and other facts about Nome. 15. Give the facts about the fur seals.

Fig. 283. A herd of Alaskan reindeer



THE PANAMA CANAL ZONE

265. The Panama Canal.—In 1513 Balboa, a Spanish explorer, left his ships, climbed the hills and went through the forests of the Isthmus of Panama, until he came to the Pacific Ocean. He was the first European to stand on the Pacific shore in the Western Hemisphere. Very soon there was talk among the Spanish of a canal, but it was not to be dug until almost four centuries later.



In 1881 the canal was begun, with French capital, under a French engineer, at a point where the isthmus is about 40 miles wide. This enterprise failed after much work was done. In 1903 the United States acquired, by treaty with the Republic of Panama, the *Canal Zone*, a strip of land 10 miles wide from ocean to ocean. The canal runs through the middle of this strip; it was completed in about ten years. The Panama Railroad, also owned by the United States, passes through the Zone from Colon to Panama (Fig. 285). For the canal and Canal Zone a governor is appointed by the President of the United States.

The Gatun Dam, a vast structure, has turned the valley of the Chagres River into a large lake. By locks, the largest ocean ships are raised to the level of this lake (Fig. 286). They sail on the lake partly across the isthmus, and descend by other locks in the Pacific end of the canal. The Atlantic end of the canal is farther west than the

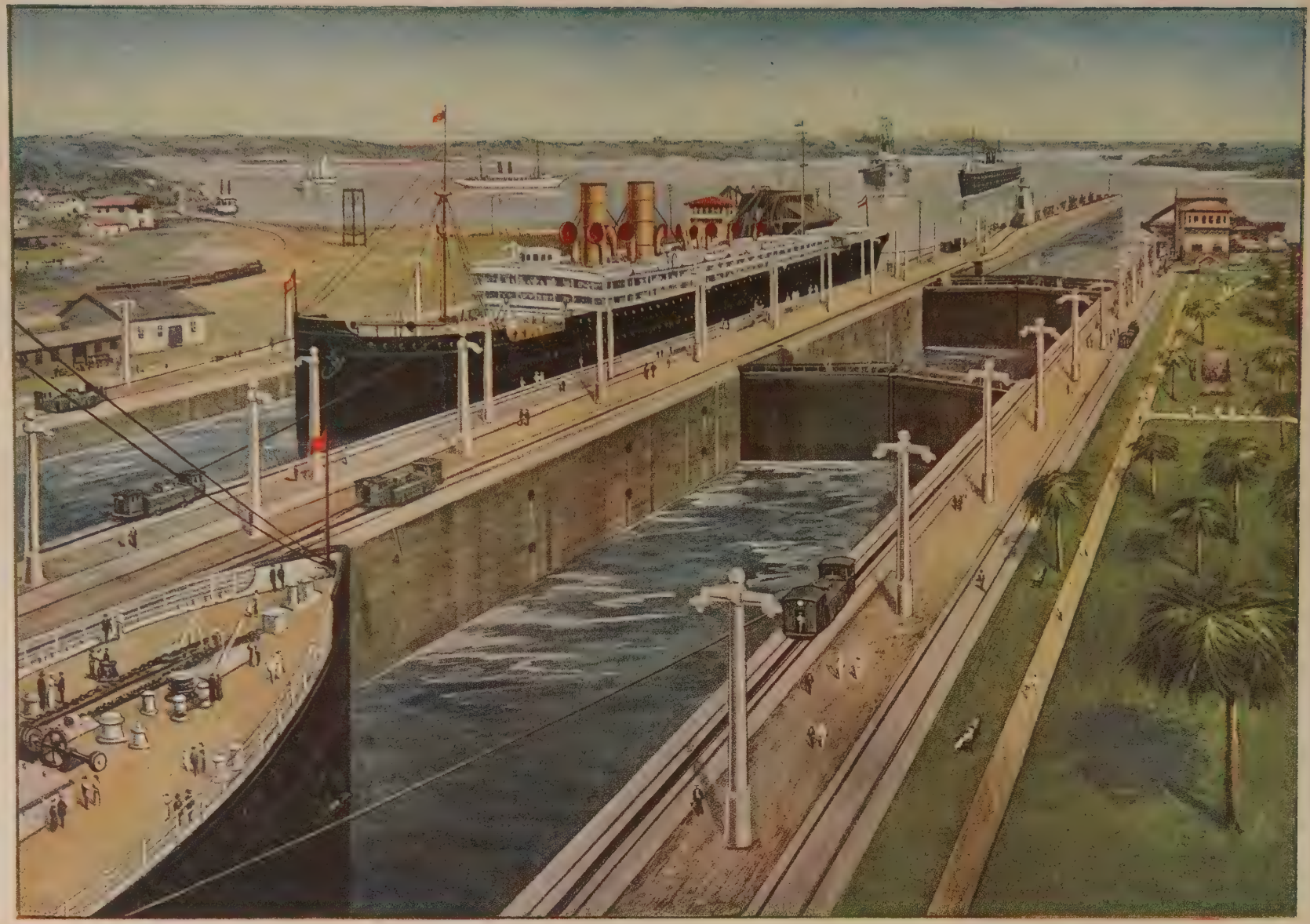


Fig. 286. Locks on the Panama Canal. Ships passing the locks are moved through and held in place by electric locomotives

Fig. 287. San Juan harbor, Porto Rico

Pacific end, so that a ship sails southeast in passing from the Atlantic Ocean to the Pacific. The canal is fortified by the United States and is open to the ships of all nations.

Before the Suez Canal and the Panama Canal were dug a ship could not go from New York or London to the Pacific Ocean without going around either Cape Horn or the Cape of Good Hope. Now, by way of these canals, a ship can go around the world in the Northern Hemisphere. The Panama Canal makes it much easier for vessels from Atlantic and Gulf ports to reach our Pacific ports, as well as those of Asia and western South America. It saves 8000 miles in the voyage from New York to San Francisco.

Review.—1. What are the length, width, and position of the Canal Zone? 2. How was it acquired by the United States? 3. What European first crossed the isthmus? At what date? 4. What are the chief features of the canal? 5. Make from memory an outline map of the isthmus and the canal.

PORTO RICO

266. Climate.—Porto Rico is the most eastern of the four large islands of the West Indies. It lies at about 18° north latitude, and has an even, tropical climate. It is not excessively hot, because it is surrounded by ocean waters, and is in the course of the northeast trade winds (Sec. 29). As the island has mountains of moderate height the trade winds are forced to higher altitudes in crossing them, and as a consequence more rain falls on the northeast side than on the southwest. There are parts of this island where irrigation is needed at some period of the growing season.

267. People and Industries.—The area of Porto Rico is about three fourths that of Connecticut. The population is nearly equal to that of Connecticut, about three fifths being white and two fifths negro. The island was long under the rule of Spain, but was ceded to the United States in 1898, following the war of that year. The governor and some other officers are appointed by the President of the United States, but the people elect the legislature, so that Porto Rico is largely self-governing.

A modern educational system is being developed, and roadways, including railroads, are being constructed, with telegraph and telephone lines. Sugar is the chief product, and the amount has vastly increased under American rule. Coffee, tobacco, and a variety of tropical fruits also are raised. Vegetables are now sent in large quantities to the winter markets of New York and other northern cities and may be purchased in these cities within a week after being gathered from the truck farms of Porto Rico. San Juan, the capital (Fig. 287), and Ponce are the largest cities.

268. St. Thomas, etc.—East of Porto Rico are the Virgin Islands. Three of them were bought from Denmark by the United States for $25,000,000 in 1916. They are St. Thomas, St. John, and St. Croix. They are chiefly valuable to our country because of the excellent harbor in St. Thomas. Most of the people are negroes.

Review.—1. Give latitude and area of Porto Rico. 2. Which side of the island receives the greater rainfall? Why? 3. What changes have taken place since 1898? 4. What are the leading products? 5. Give the name and location of the capital. 6. What are the products of Porto Rico?

7. Locate St. Thomas. For what is it noted?

THE HAWAIIAN ISLANDS

269. Size and Location.—The Hawaiian group consists of a chain of nine islands extending southeast and northwest in the north Pacific Ocean. They are between 18° and 23° north latitude, or just south of the Tropic of Cancer, and are about 2000 miles from San Francisco, and about 5000 miles from Hongkong. The total area of the islands is considerably less than the area of Massachusetts, and the population is more than 250,000. Hawaii is the southeastern member of the group and contains more than half of the land surface; it is over 70 miles across in any direction.

270. Volcanoes.—All the islands are volcanic and have been built up from the deep sea bottom by volcanic eruption. The highest peaks are on Hawaii and reach nearly 14,000 feet above the sea. At the top of Mauna Loa, and at another point on the east side of the mountain, are the largest craters of active volcanoes in the world. They are basins several hundred feet deep and two or three miles wide. When the volcanoes are quiet, the floors of these craters are cooled in places, and hard enough to walk on, but they contain lakelets of spluttering lava. At intervals of some years, the lava rises in the higher crater until it runs out of some break in the side of the mountain and flows slowly down the slope (Fig. 288). The stream of melted rock may flow fifty miles and fall into the sea.

271. Climate.—The islands are in the belt of the northeast trade winds, which blow over the Pacific the same as over the Atlantic Ocean. Hence the northeastern slopes of the islands receive more rain than the southwestern parts. The climate is mild and even, because the islands are in the tropical region and are surrounded by warm ocean waters. The winters are wet and the summers dry, but the temperature varies only about 10° throughout the year. The vegetation is luxuriant (Fig. 289).

272. Government and People.—The islands were under native rulers until 1893, when a republic was established. Five years later they were annexed by the United States. They now form the organized territory of Hawaii, with a legislature, and a delegate in Congress at Washington. The original population was Malayan, like that of many other islands in the Pacific Ocean. The people are now of many nationalities,—natives, Japanese, Chinese, Portuguese, Filipino, American, and others. Chinese immigrants are now excluded. The English language is commonly spoken and is used in the schools.

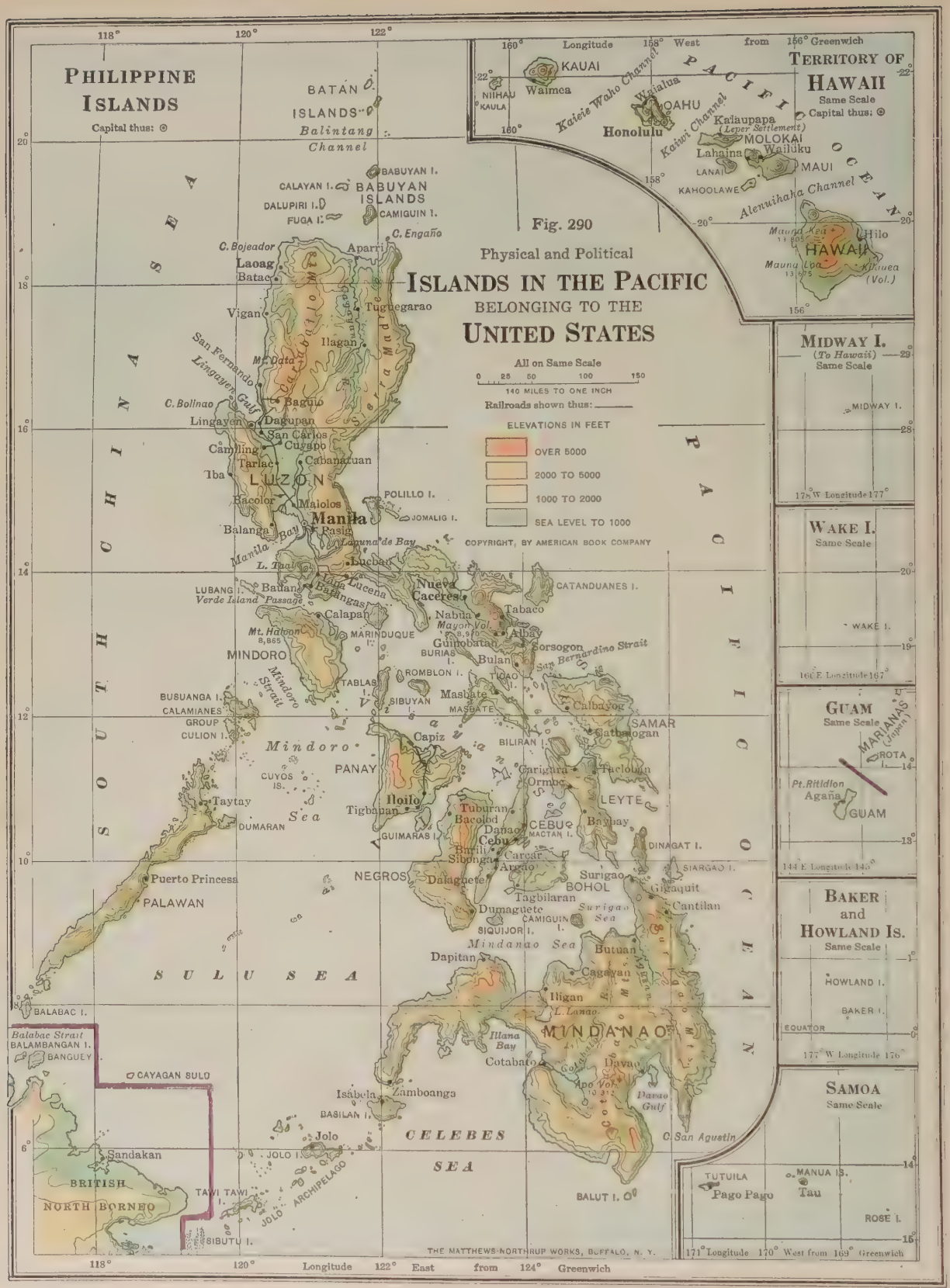
273. Industries.—Pineapples and other tropical fruits, tobacco, and rice are raised for home use and export, but by far the greatest

U. S. Dept. of Ag., Forest Service

Fig. 288. Lava flow from a Hawaiian volcano

U. S. Dept. of Ag., Forest Service

Fig. 289. Hawaiian jungle


PHILIPPINE ISLANDS
Capital thus: ⊙
BATAN I.
ISLANDS
Balintang Channel
BABUYAN I.
CALAYAN I.
BABUYAN ISLANDS
DALUPIRI I.
CAMIGUIN I.
FUGA I.
C. Engaño
C. Bojeador
Aparri
Laoag
Batac
Vigan
Tuguegarao
Cagayan Valley
Sierra Madre
Ilagan
San Fernando
Lingayen Gulf
Mt. Data
C. Bolinao
Baguio
Lingayen
Dagupan
San Carlos
Curgao
Camiling
Tarlac
Cabanatuan
Iba
LUZON
Bacolor
Malolos
POLILLO I.
Manila
JOMALIG I.
Balanga
Pasig
Laguna de Bay
Manila Bay
L. Taal
Lucban
Lucena
Nueva Cáceres
CATANDUANES I.
LUBANG I.
Verde Island Passage
Batangas
Baian
Calapan
Tabaco
Mt. Halcon 8,865
MARINDUQUE I.
Mayon Vol. 8,970
Albay
Guimbatan
Sorsogon
San Bernardino Strait
BURIAS I.
Bulan
MINDORO
Mindoro Strait
TABLAS I.
ROMBLON I.
TICAO I.
BUSUANGA I.
CALAMIANES GROUP
CULION I.
SIBUYAN I.
Masbate
MASBATE I.
Calbayog
SAMAR
Catbalogan
Capiz
BILIRAN I.
Visayan Sea
Mindoro Sea
PANAY
CUYOS IS.
Carigara
Tacloban
Ormoc
LEYTE
Taytay
Iloilo
Tigbauan
Tuburan
Bacolod
Cebu
Baybay
DUMARAN
GUIMARAS I.
Danao
MACTAN I.
Cebu
Barili
Carcar
Sibonga
Argao
DINAGAT I.
SIARGAO I.
Puerto Princesa
PALAWAN
NEGROS
Dalaguete
Surigao
BOHOL
Tagbilaran
Dumaguete
Cantilan
Surigao Sea
CAMIGUIN I.
SIQUIJOR I.
Mindanao Sea
Dapitan
Butuan
Cagayan
SULU SEA
Iligan
L. Lanao
BALABAC I.
Balabac Strait
BALAMBANGAN I.
BANGUEY I.
MINDANAO
Illana Bay
Cotabato
Davao
Gulf of Davao
Apo Vol. 9,610
CAYAGAN SULU
Isabela
Zamboanga
Davao Gulf
BASILAN I.
Jolo
CELEBES SEA
C. San Agustin
Sandakan
JOLO I.
BRITISH NORTH BORNEO
TAWI TAWI I.
JOLO ARCHIPELAGO
SIBUTU I.
BALUT I.
THE MATTHEWS-NORTHRUP WORKS, BUFFALO, N. Y.
Longitude 118° 120° 122° East from 124° Greenwich
Longitude 160° 158° West from 156° Greenwich
TERRITORY OF HAWAII
Same Scale
Capital thus: ⊙
KAUAI
NIIHAU
KAULA
Waimea
Kaiele Waho Channel
Kaiwi Channel
OAHU
Honolulu
Kalaupapa
(Leper Settlement)
MOLOKAI
Lahaina
Wailuku
LANAI
MAUI
KAHOOLAWE
Alenuihaha Channel
Mauna Kea 13,805
Hilo
HAWAII
Mauna Loa 13,675
Kilauea (Vol.)
PACIFIC OCEAN
Fig. 290
Physical and Political
ISLANDS IN THE PACIFIC
BELONGING TO THE
UNITED STATES
All on Same Scale
0 25 50 100 150
140 MILES TO ONE INCH
Railroads shown thus:
ELEVATIONS IN FEET
OVER 5000
2000 TO 5000
1000 TO 2000
SEA LEVEL TO 1000
COPYRIGHT, BY AMERICAN BOOK COMPANY
MIDWAY I.
(To Hawaii)
Same Scale
MIDWAY I.
178° W Longitude 177°
WAKE I.
Same Scale
WAKE I.
166° E Longitude 167°
GUAM
Same Scale
MARIANAS (Japan)
ROTA I.
Pt. Ritidlon
Agaña
GUAM
144° E Longitude 145°
BAKER and HOWLAND IS.
Same Scale
HOWLAND I.
BAKER I.
EQUATOR
177° W Longitude 176°
SAMOA
Same Scale
TUTUILA
Pago Pago
MANUA IS.
Tau
ROSE I.
171° Longitude 170° West from 169° Greenwich

P. and A. Photo

Fig. 291. The city and harbor of Honolulu

product is cane sugar. Much American capital is invested in this industry, and much of the raw sugar goes to San Francisco to be refined. The islands are one of the chief sources of sugar for use in the United States. The annual export of sugar to this country is more than 1,000,000,000 pounds. Most of the commerce is with the United States.

Hilo is the chief city of the island of Hawaii. Honolulu is a larger city on the island of Oahu, and is the capital of the territory (Fig. 291). Many lines of steamships touch at Honolulu, especially those plying between the ports of our Pacific coast and those of Asia. There is a United States naval station for the coaling and repair of ships. As a calling point and coaling place the city is important. The voyage across the Pacific Ocean takes about three weeks for the fast steamers, and it would be difficult for a ship to carry all the coal needed for so long a voyage.

Review.—1. Give the number, latitude, and area of the Hawaiian Islands. 2. Which is the largest of the group, and what is the distance across it? 3. Which island has active volcanoes? 4. Describe the craters and the manner of eruption. 5. In what respect does the rainfall resemble that of Porto Rico? 6. Give the important facts in the history of the islands. 7. What is the chief product? 8. What special value have these islands to the United States?

Fig. 292. Filipino native house

THE PHILIPPINE ISLANDS, GUAM, AND SAMOA

274. Physical Features.—The Philippine Islands are southeast of China, and lie between 4° and 22° north latitude. They are separated from the mainland of Asia by the South China Sea. There are many hundreds of the islands, with a total area of about 115,000 square miles. Luzon in the north is the largest, with 41,000 square miles of surface, and Mindanao in the south has 36,000 square miles. Much of the land is hilly or mountainous, and there are many volcanic peaks. Earthquakes are not uncommon. The higher peaks are from 8000 to 10,000 feet in altitude.

275. Climate.—The climate is warm, and the rainfall is heavy. The lowest temperature ever experienced in Manila is about 60°. The cool season, or winter, is dry, and the summers are wet. The soil and rock waste are deep, and the ground is shaded with a dense growth of plants. Because of the dampness, houses are raised above the ground (Fig. 292), and the roads and trails are often impossible. The most needed improvement in the islands is the construction of good roads.

276. History.—These islands were discovered by Magellan in 1521, in the first exploring expedition that went around the world. Magellan himself was killed here, but the islands soon came under Spanish rule.

The battle of Manila Bay

in 1898 ended in the destruction of the Spanish fleet and led to the transfer of the islands in that year to American control. The islands contain about 10,000,000 people. Of these, a small number are Americans and Europeans, 50,000 are Chinese, and a smaller number are blacks, known as Negritos; but most of the people are Malayans. Chinese immigration is now forbidden, as it is in Hawaii and in the main part of the United States.

Fig. 293. Baling hemp

Before 1898 little was known of a large part of the islands. Much exploration and surveying have now been done by the American army and by men of science, and the United States Coast Survey has done a great work in making soundings and charts of the dangerous seas in and about the islands.

277. Government and Education.—The governor general and a few other officers are appointed by the President of the United States. A Philippine legislature of two houses is elected by the people; but its acts may be vetoed by the governor general, or annulled by Congress. An excellent system of education has been organized under a director of education and division superintendents, and the schools are taught by several hundred American teachers and several thousand Filipinos. A few districts, because their people are only partly civilized, are still under military rather than civil government.

278. Agriculture.—The resources of the islands are very large, but are not yet well known and are little developed. The soils are very deep and rich; in many places they are derived from volcanic rocks and fertilized by ages of plant growth in a moist, warm region.

Manila hemp (Fig. 293) and Manila rope are well known in the United States, and form a considerable export of the islands. Still more important is the coconut, which yields much oil used in food products and in making soap. Copra is the dried meat of coconuts. Raw cane sugar and tobacco are among the greater exports to the United States. Rice is the main food, but is not sent to other countries. Corn, bananas, coffee, and spices are raised. Farming methods are crude. The water buffalo, used in tilling the soil, is slow and unruly, and requires a frequent plunge in mud and water. This habit of the creature fits it, however, for use in the rice fields, which must often be flooded (Fig. 294).

Fig. 294. Filipinos cultivating a rice field with water buffaloes

279. Forests.—As in most warm and wet countries, the forests of these islands are luxuriant. Many kinds of trees are found, including more than fifty species of hardwoods. Some of these are heavy and take a fine polish, and are therefore suitable for cabinet work. Some are so hard that an ordinary saw will not cut them. The top of a large dining table is sometimes made from a single slab of native wood. There are fourteen forest districts and fifty-five stations, all in charge of expert foresters. In this new care of the forests, as well as in the agricultural experiment stations, in the educational system, and in the charting of the coasts, the good work of the American government is seen.

Fig. 295. Street in Manila, Philippine Islands

The bamboo and rattan are put to a variety of uses by the natives, especially in making tools, domestic utensils, and the houses of the poor. While the cultivated Filipinos have homes of comfort and elegance, the poorer people and the savage tribes often live in huts of poles, roofed with a thatch of boughs or of grass.

Soft coal is found, and nearly all the important metals are known to exist in the Philippines, but as yet little mining has been done.

280. Commerce and Cities.—Much of the surface is covered with a jungle, but the muddy trails are giving way to good roads, several thousand miles of which have been built. Thus soils, forests, and minerals are made accessible. Several railroads have been built during the recent years of American occupation, and there are now in the islands more than 6,000 miles of telegraph lines. There is ocean cable service to Asia and to the United States.

The chief city is Manila, the capital, which has a population of about 250,000 (Fig. 295). The second city in population and importance is Iloilo, on the island of Panay.

281. Guam.—A few hundred miles east of the Philippines is the small island of Guam, which the United States took from Spain in the war of 1898. It is useful as a coaling station for vessels visiting the United States, Hawaii, and the Philippine Islands.

282. Samoan Islands.—The island of Tutuila and a few smaller islands of the Samoan group belong to the United States; the others are controlled by New Zealand. Tutuila is a mountainous island, with the excellent harbor of Pago Pago, where a United States naval station is maintained.

The American flag has also been raised over a few other very small islands in the Pacific Ocean (Fig. 290).

Review.—1. What is the range of latitude in the Philippine Islands? 2. Which is the largest island of the group? 3. What is the condition of the roads in the islands? Give reasons.

4. What white man discovered the Philippines? Give the date. 5. What event took place in 1898? 6. How large is the population? What kinds of people compose it? 7. How are the islands governed? 8. What is the system of education?

9. What is the most important product for export? 10. What are important facts about the forests and woods?

North East Foreland
ARCTIC OCEAN
PACIFIC OCEAN
ATLANTIC OCEAN
GREENLAND
(To Denmark)
Hudson Land
C. Brewster
Denmark Strait
ICELAND
Reykjavik
Grant Land
AXEL HEIBERG
ELLESMERE I.
Etah
Hayes Peninsula
Smithson Sound
Bering Strait
Nome
Pt. Barrow
Mt. McKinley
Yukon R.
Fairbanks
Mackenzie R.
Beaufort Sea
C. Bathurst
Melville I.
BANKS ISLAND
Melville Sound
PRINCE OF WALES ISLAND
Prince Albert Land
Bathurst I.
North Devon
Lancaster Sound
Baffin Bay
Upernivik
DISKO I.
C. Dan
Davis Strait
C. Farewell
Godthaab
Julianehaab
Sydprövelen
PROVISIONAL DISTRICT OF FRANKLIN
Wollaston Land
Victoria I.
Cockburn Land
N. MAGNETIC POLE
Melville Peninsula
Fox Channel
Fox Land
Cumberland Sound
Baffin Land
NORTHWEST TERRITORIES
Dawson
Ft. McPherson
Hudson Bay
Ft. Norman
Arctic Circle
PROVISIONAL DISTRICT OF MACKENZIE
SOUTHAMPTON ISLAND
Hudson Strait
RESOLUTION I.
C. Chidley
YUKON
White Horse
Ft. Simpson
Great Slave Lake
KEEWATIN
Ramah
LABRADOR
Sitka
Prince Rupert
QUEEN CHARLOTTE ISLANDS
Ft. Nelson
Ft. Chipewyan
Athabasca R.
Lake Athabasca
Ft. St. John
Dunvegan
HUDSON BAY
Payne L.
Hopedale
Hamilton Inlet
L. Minto
Ft. Churchill
York Factory
BRITISH COLUMBIA
Edmonton
ALBERTA
Banff
Calgary
Saskatoon
Prince Albert
Yorkton
Regina
Moosejaw
Medicine Hat
Vancouver
Victoria
Great Whale R.
James Bay
Big L.
Eastmain R.
L. Mistassini
Gulf of St. Lawrence
NEWFOUNDLAND
St. Johns
Cape Race
Gaspé Peninsula
PRINCE EDWARD I.
NEW BRUNSWICK
NOVA SCOTIA
Halifax
St. John
Sydney
C. BRETON I.
SABLE I.
Winnipeg
Kenora
Port Arthur
Ft. William
Quebec
Montreal
Ottawa
Kingston
Toronto
Hamilton
London
Buffalo
Detroit
Duluth
Portland
C. Sable
Fig. 296
ELEVATIONS IN FEET
OVER 5000
2000 TO 5000
1000 TO 2000
SEA LEVEL TO 1000
Physical and Political
DOMINION OF CANADA
NEWFOUNDLAND AND GREENLAND
Capitals of Countries thus: ◎ Capitals of Provinces thus: ⊙
COPYRIGHT, BY AMERICAN BOOK COMPANY
Scale of Statute Miles
0 100 200 300 400 500
485 MILES TO ONE INCH
THE MATTHEWS-NORTHRUP WORKS, BUFFALO, N. Y.
120° Longitude West 110° from Greenwich 100
130°
70°
60°

Fig. 297. First session of the Canadian Parliament held in the new Parliament Building, Ottawa, February 26, 1920

NORTHERN COUNTRIES OF NORTH AMERICA

	Area, Sq. Mi.	Population, 1910	Capital
Canada	3,759,365	8,788,000	Ottawa
Newfoundland, etc.	49,680	268,000	St. Johns
Greenland . . .	838,000	14,000	

Map Study.—1. What provinces of Canada border the United States? 2. What two provinces are east of New Brunswick? 3. What lakes form a large part of the southern boundary of Ontario? 4. What water touches northern Ontario? 5. Bound the territory of Yukon.

6. What is the principal river system of northern Canada? 7. What lakes belong to it? 8. Trace a water passage from Edmonton, in Alberta, to the Atlantic Ocean; from Winnipeg, in Manitoba. 9. What river flows south in British Columbia? What rivers form part of the boundaries of Ontario?

10. What provinces lie on the shores of the Gulf of St. Lawrence? 11. What is the capital of each of these? 12. Locate Montreal; Ottawa; Toronto. 13. Name two cities on the western side of Lake Superior. 14. Locate Winnipeg; Vancouver; Victoria.

THE DOMINION OF CANADA

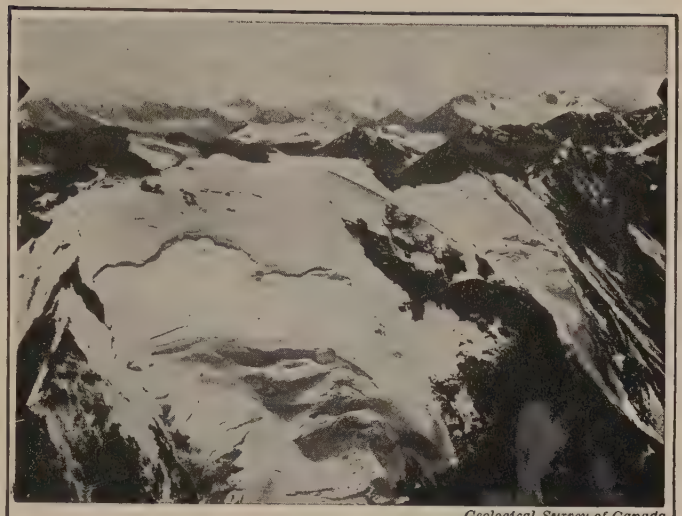
283. Surface and Provinces.—The most southern point in Canada is in about 42° north latitude, on the shores of Lake Erie, not far from Detroit. The northern parts are on the Arctic Ocean, but a few hundred miles from the Pole. Like the United States, Canada has low mountains in the east, high mountains in the west, and broad plains lying between the two highlands.

Southern Canada may be divided into four regions. On the east are Nova Scotia, New Brunswick, and Prince Edward Island, which are often called the Maritime Provinces. This is a good name because Nova Scotia is a peninsula, Prince Edward Island lies in the Gulf of St. Lawrence, and New Brunswick has long shore lines on the Bay of Fundy and the Gulf of St. Lawrence. An old name for this region is Acadia. Here are the only ports of eastern Canada that are free from ice throughout the year. The most important

Fig. 298. Physical and Political
WESTERN CANADA
Scale of Statute Miles
0 50 100 200 300
250 MILES TO ONE INCH
Hudson Bay
Edmonton
Calgary
Regina
Winnipeg
Vancouver
Victoria
Lethbridge
Prince Albert
Saskatoon
Brandon
Moosejaw
Swift Current
Medicine Hat
Fort Nelson
Fort St. John
Dawson Creek
Prince Rupert
Fort Simpson
Fort McLeod
Fort Liard
Fort Smith
Ft. Chipewyan
Ft. Vermilion
Peace River Landing
Hudson Hope
Dunvegan
McMurray
Lac la Ronge
Ile a la Crosse L.
Buffalo L.
Lesser Slave L.
Athabaska L.
Great Slave L.
Great Bear L.
Reindeer L.
Churchill
Nelson House
Norway House
Cedar Lake
Lake Winnipeg
Port Nelson
Ft. Churchill
Etawney L.
Granville L.
Southern Indian L.
Wollaston L.
Black L.
Cree L.
Hay L.
Peace R.
Athabaska R.
Mackenzie R.
Churchill R.
Nelson R.
Hayes R.
Saskatchewan R.
Red Deer R.
Bow R.
Assiniboine R.
Qu'Appelle R.
Souris R.
Red R.
Lake of the Woods
Mt. Whipple
Mt. Garruthers
Mt. Hooker
Mt. Forbes
Mt. Robson
Mt. Assiniboine
Rocky Mts.
Banff
Jasper
Arrowhead
Kamloops
Okanagan L.
Grand Forks
Nelson
Rossland
Revelstoke
Yoho
Glacier
Field
Medicine Hat
Maple Creek
Swift Current
Moosejaw
Regina
Indian Head
Portage la Prairie
Brandon
Minnedosa
Neepawa
Dauphin L.
Manitoba
Selkirk
Winnipeg
Morden
Emerson
Pembina
Wetaskiwin
Hardisty
Lacombe
Stettler
Red Deer
Battleford
North Battleford
Rosthern
Melfort
Hudson Bay Jct.
Watrous
Outlook
Yorkton
Wapella
Wolseley
Whitewater L.
Winnipegosis
Moose Jaw
Assiniboia
Moosomin
Wapella
Estevan
Weyburn
Bienfait
Carlyle
Virden
Edmonton
Fernie
Cranbrook
Kootenay L.
Kootenay R.
Columbia R.
Columbia Mts.
Selkirk Mts.
Purcell Mts.
Gold Range
Cariboo Mts.
Hazelton
Babine L.
Tacla L.
Stuart L.
Francois L.
Fraser R.
Thompson R.
Okanagan L.
Shuswap L.
Quesnel L.
Chilcotin R.
Blackwater
Alexandria
Quesnel
Ashcroft
Kamloops
Vernon
Penticton
Grand Forks
Nelson
Rossland
Trail
Revelstoke
Golden
Donald
Yoho
Glacier
Field
Lake Louise
Banff
Jasper
Mt. Robson
Mt. Assiniboine
Rocky Mts.
Crowsnest Pass
Lethbridge
Maple Creek
Swift Current
Medicine Hat

are Halifax, St. John, Sydney, and Charlottetown. The surface is low and nearly flat in Prince Edward Island, but higher and quite hilly in the other two provinces. The relief in general is much like that of New England, except that the latter region has real mountain ranges and peaks.

The second region consists of the provinces of Quebec and Ontario. These lie along the St. Lawrence River and the Great Lakes, and extend northward into a wilderness of rocks, mountains, and forest. Northern Ontario and Quebec border Hudson Bay, and Quebec has a long shore line on the Gulf of St. Lawrence. The lowlands along the St. Lawrence and the Great Lakes have rich farms and the largest cities and densest population of the country. Some of this region is hilly, but in southern Ontario there are lake plains like those of western New York.



Geological Survey of Canada

Fig. 300. Snow and ice fields in the Canadian Rockies

The third region embraces the provinces of Manitoba, Saskatchewan, and Alberta. It consists of prairie and dry plains, and, at the south, is like the plains of North Dakota, Nebraska, and Montana. This region has in it Lake Winnipeg, and much of it drains by the Red River, the Saskatchewan, and other streams, through the Nelson River into Hudson Bay. It is the most important part of Canada for the raising of grain. A part of the province of Manitoba lies west of Hudson Bay and is similar to northern Quebec and Ontario.

The fourth region is the province of British Columbia. Through it, the Cordilleras extend from the United States on the south. They also reach over into western Alberta. On the east are the "Canadian Rockies" (Figs. 32, 38, 300), on the west is the northern continuation of the Cascade Range of Washington, and between them is the Selkirk Range. The glaciers in these mountains of Canada are larger and more numerous than in the western United States, but not so numerous or so large as those of Alaska. The southern parts of British Columbia are drained by the Columbia and Fraser rivers, and the northern parts by branches of the Mackenzie, which flows into the Arctic Ocean, and by smaller streams flowing to the Pacific Ocean.

The northern plains of Canada extend to the Arctic Ocean and include the provisional districts of Mackenzie and Keewatin. In the southern part of this region are forests, and in the north are treeless tundras (Sec. 259). In this region are Great Slave Lake and Great Bear Lake, tributary to the Mackenzie River, and many other large lakes whose outlets lead to Hudson Bay or the Arctic Ocean. The Yukon territory is mountainous and continues the highlands of British Columbia northward.

North of the main body of the continent are many large and many small islands. Much of the region is bound in perpetual ice and snow, is visited only by explorers or prospectors, and is inhabited only by a few tribes of Eskimos. A part of northern Canada is often called the Barren Lands. Some of these lands are free from snow in summer and are brilliant with flowers; they are visited by myriads of wild fowl.

Fig. 301. Vancouver harbor, and part of the British Columbia coast

284. Shore Line.—Nearly all the shore lines of Canada are rugged and broken, with deep inlets or fiords, bold headlands, and many mountainous islands. For this reason there are good harbors in British Columbia and in the Maritime Provinces. The St. Lawrence River is at tide level as far as Montreal. Along the western shore, vessels go from Seattle or Vancouver northward to Alaska in quiet waters behind the fringe of islands that border the coast. Many bays reach far into the land between high mountain spurs, or promontories (Fig. 301). Hudson Bay is an inland sea, 900 miles long, lying in the interior of Canada. It was named for Henry Hudson, whose sailors here set him adrift to perish about three years after he had sailed up the Hudson River. Both the eastern and the western coasts of Canada are important for their commerce; those of Hudson Bay may become important; but the Arctic shores must always be too cold and barren to be suitable for permanent occupation by members of the white race.

285. Climate.—The climate of the Maritime Provinces, and of the region along the St. Lawrence and the Great Lakes, resembles that of New England, New York, and Michigan. The storms of the westerly winds pass over this part of Canada, and moisture from the Atlantic that comes with the east and southeast winds gives abundant rains in summer and heavy snows in winter. Southern Ontario, in the latitude of southern Michigan, is almost surrounded by lakes, and has a mild climate. Here grapes and peaches flourish, as in western New York and southern Michigan. The Labrador coast is washed by waters drifting south from the Arctic seas, and is rainy and cold.

The summers of Manitoba, Saskatchewan, and Alberta are much like those of our own western plains, but as these provinces are farther north, the winters are longer and colder. Still, Saskatchewan and Alberta are warmer than the lands eastward about Hudson Bay. One reason is that westerly winds, called *chinooks*, in those provinces as well as southward in the United States, blow across the mountains, and the air warms as it descends upon the plains. The climate of western British Columbia is moist and mild like that of western Washington (Sec. 58).

286. Indians.—Canada, with its abundant forests, rivers, and lakes, was a natural home for many Indian tribes. They could hunt in the forest, fish in the waters, and gather abundance of wild fruits. Their canoes enabled them to make long journeys by water. These were made of strips of birch bark sewn together with split roots of spruce, lined with thin strips of cedar, and made strong by cedar ribs. The gum of some evergreen tree was used to make the seams watertight, and the canoe was so light that it could move in

shallow water and easily be carried across the portages. There are so many lakes and streams that the Indians could go almost everywhere without long portages.

287. Explorations.—The first explorations up the St. Lawrence and along the Great Lakes were made by Frenchmen, and the land was long under the French flag (Sec. 35). The missionaries and the fur hunters went through all parts of the great wilderness, and they found nothing so useful to them for travel and for carrying their packs of skins to market, as the Indian's birch-bark canoe. The search for fur-bearing animals really was more important than any other fact in the early history of Canada. After the English took possession of Canada, the hunting went on, and the Hudson's Bay Company, which had been formed long before, spread its operations over most of the country, holding many fortified posts, called factories, to which the pelts were brought in from the woods (Fig. 302). The Hudson's Bay Company is still in business as a private corporation, and has large stores and fur depots in Winnipeg, Montreal, Edmonton, and other centers.

Large parts of the vast Canadian wilderness are little known even yet, but for many years the members of the Geological Survey of Canada and other explorers have sought knowledge of the rocks, minerals, forests, rivers, and soils, making long and toilsome journeys with canoes no larger than those used by the red men centuries ago. In this way maps are prepared, information about the country is provided, and immigrants and settlers learn where there is good land for farms, where rich masses of minerals have been found, and where to build their roads.

Fig. 302. A Hudson's Bay Company trading post

288. Government and People.—After 1763 the several colonies of Canada were under the rule of Great Britain. It was not until 1867, however, that they were united under the name of the Dominion of Canada. The central government is located at Ottawa, in the province of Ontario. The governor-general is named by the British government, and the parliament consists of a senate, the senators being appointed for life, and a house of commons whose members are elected by the people.

The total population of Canada is about 9,000,000. A large number of the people still commonly use the French language. Many of the French-speaking people live in the province of Quebec, where the customs of the early settlers have remained the same until the present time. Most of the English-speaking people are of English or Scotch descent, and several hundred thousand of them were born in the United Kingdom. Many immigrants come from the United States, and smaller numbers from continental Europe and from China and Japan.

289. Forests.—The forests cover more than 800,000 square miles, or nearly one fourth of the country. The eastern provinces bear many hardwoods, and pines, as well as spruces, aspens, and larches. More than a third of the area of Nova Scotia is covered with forest. The great lumbering region of the Maritime Provinces is New Brunswick, which has large mills at Fredericton and St. John.

The eastern forests run through Quebec and Ontario. The Ottawa Valley is important for its white pine, which, with other timber, is floated down the river to Ottawa, where

large mills work it up into lumber. Much lumber is also manufactured and marketed at Montreal and Toronto.

The forests of central Canada extend between Lake Superior and Hudson Bay to the northwest, across the upper parts of the Mackenzie basin, and merge with the forests of British Columbia. The valleys and lower slopes of this province are covered with wonderful forests of cedar, spruce, and Douglas fir, similar to the trees of Washington and Oregon. Here is the third great center for lumbering in Canada (Fig. 303), and much of the product goes to Vancouver and is shipped to foreign lands.

Many of the soft woods, like spruce, especially the smaller and imperfect trees, are used for making wood pulp. The forests of northern Quebec have not many large trees, but the timber is suitable for pulp, railroad ties, telegraph poles, fences, mining timber, and firewood. Tree growth in the cold north is very slow, and a small tree may have required hundreds of years for its development.

Forest fires are very destructive, and they are started not only through carelessness of hunters and by sparks from locomotives, but also by lightning. In a dry time the mossy floor of the forest, the thick undergrowth, the dry, fallen timber, and the pitchy character of many of the trees, cause a fire to spread with fearful rapidity, outrunning and destroying the swiftest animals of the forest. Half of the timber wealth of Ontario is said to have been destroyed by fires. While the forests are one of the main resources of Canada, there is danger of their exhaustion, and measures are being taken for their care and preservation.

Two regions have few trees or none. These are the plains west of Winnipeg and the Barren Lands of the north. On the western plains many farmers are planting trees, for windbreaks, for fuel, and for other uses.

290. Fisheries and Furs.—Canada has a broken shore line, and in its numerous bays there are found great numbers of fish. On the east, off the shores of Nova Scotia, is the shallow water of the Banks of Newfoundland. Here and in the Gulf of St. Lawrence a great many fish are caught. In all the Maritime Provinces fishing is an important industry. The cod, herring, and halibut are especially valuable. Many lobsters also are taken. Nova Scotia has the largest fishing industry in the eastern part of Canada, carried on from Halifax, Yarmouth, and other ports (Fig. 304).

Fig. 303. Logging in British Columbia

Fig. 304. Drying codfish at Digby, Nova Scotia

The country has thousands of lakes and rivers in which trout, whitefish, pickerel, pike, and other fresh-water fish flourish. Tourist fishermen from the United States frequent these waters in summer. Fishing is a large business on the lakes of Manitoba, and many men are thus employed. The fisheries of British Columbia are like those of Washington (Sec. 254) and Alaska (Sec. 262). The annual product amounts to several million dollars. The most valuable fish is the salmon; but halibut and herring also are numerous, and shellfish are gathered near the shores.

On both the Atlantic and the Pacific sides of Canada, seals, walruses, and whales are still captured in considerable numbers, but this branch of the fishing industry is smaller than it formerly was.

St. Pierre and Miquelon, near Newfoundland, are still owned by France (Sec. 38), and are used as headquarters for fishing in the adjacent waters.

Codfish from the Labrador coast are marketed in Spain, in Greece, and especially in Italy. Codfish has been called the "bread of the sea," because it is abundant, nutritious, and is easily preserved by salting, smoking, or drying. Parts of these fish are used for making glue, oil, and fertilizer, and in Arctic lands they are used even for fuel. The ordinary codfish weighs only a few pounds, but large specimens weigh more than 100 pounds each.

The Dominion is the leading fur producer among all the countries of the world. Hunting in the wild lands is now supplemented to an important degree by fur farming; foxes, raccoons, minks, muskrats, and other animals are bred for this purpose.

291. Mining.—One of the most important minerals of Canada is coal. There are three principal regions for coal mining in the Dominion. The first is Nova Scotia, where mining has been carried on for many years; Cape Breton Island abounds in coal and has large iron furnaces at Sydney. Nova Scotia furnishes most of the coal used for domestic purposes and for manufacturing in eastern Canada. The second locality is in the plains east of the Canadian Rocky Mountains. In this region the greater part of the coal is soft, and has not yet been extensively mined. The large region between Winnipeg and the St. Lawrence River has no coal, and either imports it from the United States, or brings it from Nova Scotia. The third region is British Columbia, which, like Washington on the south, has much coal. It is found both on the mainland and on Vancouver Island.

Petroleum has been found in the provinces of Alberta and British Columbia, and in the Mackenzie district. Large deposits of oil-bearing shales exist in New Brunswick and Nova Scotia.

Some iron is found in various parts of Canada, but in many cases the mines are far from coal, and the iron-smelting industry of the Dominion is not yet large.

In the province of Ontario, north of Lake Huron, are several mining centers. One of them is Sudbury, where much nickel is found; another is Cobalt, in the midst of great silver mines; and another is Porcupine, where much gold is produced. Ontario is now by far

the largest producer of gold in Canada.

The Klondike region in Yukon territory, on the borders of Alaska (Fig. 305), also yields much gold; it produced about $180,000,000 worth in one period of eighteen years. The mining center is Dawson.

Geological Survey of Canada

Fig. 305. Hydraulic mining, Klondike

Another important mineral region of Canada is in the province of British Columbia. Mountain ranges occupy much of this region, and as in the Plateau States, they abound in deposits of gold, silver, lead, and copper. Gold is found both in the gravels and in the bed rocks, and the province ranks high as a gold producer.

Much of the Canadian wilderness has been but little explored. Hence it is almost certain that many valuable mineral deposits are still unknown, and will in coming years be found in the mountains of British Columbia and in the wild and rocky parts of Ontario and Quebec. Much mineral wealth may also be discovered in the Barren Lands.

292. **Agriculture and Manufacturing.**—In the Maritime Provinces, mixed farming is carried on. Grain, fruits, and vegetables are raised and live stock is kept. Fine apples are produced in Nova Scotia. The most valuable live stock in Canada are the silver foxes that are bred in captivity in fox "ranches" on Prince Edward Island.

Southern Ontario is the chief farming region of eastern Canada, having along the Great Lakes excellent soils and a mild climate. Here wheat, apples, grapes, peaches, and various small fruits are raised. Canada ships much butter and cheese to Great Britain, and a large part of the dairy products comes from Ontario.

In recent years Manitoba, Saskatchewan, and Alberta have become wheat-raising regions. The surface, soil, and methods of raising and harvesting (Fig. 12) are like those in the great wheat region of North Central United States. Winnipeg, the chief wheat market for the district, has a grain exchange similar to that at Chicago. Many cities and villages, on all the railroad lines, have elevators to which the farmers draw their wheat for transfer to the railroads. Oats are raised (Fig. 306), but the summers are short and cool, and corn does not do so well as in the North Central States. Wheat has been raised, though not in large quantities, in the valley of the Peace River, belonging to the Mackenzie River system. Cattle and horses are raised on the dry plains, especially in Alberta (Fig. 307).

British Columbia has rich agricultural regions, though only partly developed. They are suitable for grain and general farming, and the mild climate of the coasts and valleys especially fits these areas for fruit culture.

Fig. 306. Harvesting oats in western Canada

Fig. 307. Round-up of horses on an Alberta ranch

The manufactures of Canada include agricultural machinery, vehicles, and other iron and steel goods. The weaving of textiles and the preparation of food products and of lumber and wood pulp are also important.

293. Transportation by Water,—The principal eastern seaports are Halifax, St. John, Quebec, and Montreal. Ships of several lines sail from Montreal to European ports, except during the winter months, when the St. Lawrence River is blocked with ice. From Montreal ships of considerable size can go to the head of the Great Lakes at Duluth or Chicago. By canals they pass the rapids of the St. Lawrence River and enter Lake Ontario. By the Welland Canal they go up to Lake Erie. Near the head of Lake Huron, the Soo Canal conveys them to Lake Superior.

Fig. 308. Bridge across the St. Lawrence near Quebec, completed in 1917. The largest ships can pass under it

The Red River and the Saskatchewan are navigable for boats of small draft for hundreds of miles, to Lake Winnipeg. From the lake to Hudson Bay the Nelson River is broken by difficult rapids. The Mackenzie River and its branches afford extensive navigation in northern Canada. The Hudson Bay is not much used by ships, but many Canadians believe that it will become an important outlet to Europe for the grain of the western plains. The Canadian government has begun to build a railroad from Winnipeg to Hudson Bay.

Both transportation and manufactures will be favored by the water power which can be made available in Canada, amounting to more than 18,000,000 horse power at ordinary minimum flow of the streams.

294. Railroads.—Canada is building many railroads. The Canadian Pacific Railway joins St. John, Quebec, and Montreal in the east with Winnipeg and Vancouver in the west. It has branches to Toronto and many other cities in the eastern provinces, and in the prairies and plains has a network of lines that carry away much of the product of the farms and ranches of Manitoba, Saskatchewan, and Alberta. It goes through wonderful valleys and passes in the western mountains, and at Vancouver connects with steamships of the same company bound for Japan, China, and Australia. From Montreal the company's ships run to Liverpool, Glasgow, London, and Antwerp.

The Grand Trunk Pacific Railway now extends from Moncton, New Brunswick, to Winnipeg, to Edmonton, the capital of Alberta, and to Prince Rupert, a new seaport on the Pacific just south of Alaska. Other parts of this system connect Chicago and Portland, Maine, with Montreal. All these lines are now controlled by the government and belong to the Canadian National Railways. These national railways include also the former Intercolonial and Canadian Northern Railways and join Halifax to Vancouver and Prince Rupert. There are two great railroad systems reaching across Canada from ocean to ocean. Port Arthur and Fort William on Lake Superior receive wheat by the railroads, store it in elevators capable of holding millions of bushels, and thence ship it down the lakes for eastern markets, or for export to Liverpool. A line joining the National Railways to Hudson Bay is under construction.

295. Cities.—Ottawa is the capital of the Dominion of Canada, and is an important industrial center, especially for the timber product of Ontario (Fig. 297).

Quebec is an old city standing on a bold promontory north of the St. Lawrence River. It was here that Wolfe won his victory over Montcalm on the Heights of Abraham. It was as a result of this battle, fought in 1759, that this part of America passed from the French to British rule. The dredging of the St. Lawrence has made it possible for ocean vessels to go up to Montreal, and consequently Quebec, though prosperous, is not relatively so important a port as in an earlier period.

Montreal, with more than six hundred thousand people, is the metropolis of Canada (Fig. 309). It is served by the transcontinental railroads, and is connected by rail with Ottawa on the north, and with New York, by way of Champlain and Hudson valleys, on the south. It is the seat of McGill University.

Toronto is the largest city of Ontario, and the second city of Canada. It has much manufacturing, is in the midst of a fertile region, has many fine buildings, and is the seat of Toronto University. Kingston is at the foot of Lake Ontario. Hamilton is at the head of the lake, and is in the midst of the fruit region. There is an extensive development of electrical power on the Canadian as well as on the American side of Niagara Falls.

Winnipeg is the metropolis of western Canada. It has grown rapidly on the site of one of the forts of the Hudson's Bay Company, where the Assiniboine joins the Red River. All the great railroads that cross Canada center at this market city of the prairies. Southward, railroads run to Minneapolis and Chicago. Regina and Moosejaw in Saskatchewan, and Calgary and Edmonton in Alberta, are railroad centers and are important and growing cities.

Fig. 309. Montreal, seen from the water front. Mount Royal in the distance

Vancouver is the great Canadian seaport on the Pacific coast. Its site was a forest until 1885, and it is now a large and splendid city, the terminus of the Canadian Pacific Railway, and the point of departure for ships running to all countries on the Pacific Ocean (Fig. 301). Victoria, at the south end of Vancouver Island, has a beautiful situation, and is chiefly important as the capital of British Columbia.

Geological Survey of Canada

Fig. 310. On the barren and rocky coast of Labrador

NEWFOUNDLAND

296. Newfoundland is a colony of Great Britain, but did not, like other colonies of this region, join the Dominion of Canada. It is nearly as large as the state of New York, but has only about a quarter of a million people. The eastern part of Labrador is under the government of Newfoundland (Fig. 310). The island has many lakes and rivers, but much of it is rocky or marshy, and unproductive. There is some timber, and English firms have built large paper and pulp mills. Iron, copper, coal, gold, silver, and lead are found. The principal industry is fishing. A narrow-gauge railroad crosses the island from east to west, ending on the east at St. Johns, the capital and the only city of considerable size. Its interests are fishing and shipping.

GREENLAND

297. Greenland is the largest island in the world. It has over 800,000 square miles of surface, most of which is covered by an ice sheet. There are several towns and villages on the coast, inhabited by Danes and the native Eskimos. The island was discovered more than nine hundred years ago by the daring sailors of northern Europe, and it now belongs to Denmark. Furs, ivory, eider down, and seal oil are the chief products.

Review.—1. Name and describe the four regions of southern Canada. 2. Describe the northern part of Canada. 3. What name is often given to much of northern Canada? 4. How far is the St. Lawrence River affected by the tides? 5. Describe the shores of British Columbia. 6. What are the chinook winds? 7. Why has southern Ontario a milder climate than the rest of eastern Canada?

8. Describe the canoes of the Indians. 9. Give an account of the Hudson's Bay Company. 10. When was the Dominion of Canada formed?

11. What parts of Canada have little or no forest? 12. What are the three leading lumber regions of Canada? 13. What causes the forest fires to spread rapidly?

14. What are the chief fishing centers of Nova Scotia? 15. Give an account of the uses of the codfish.

16. In what parts of Canada is coal found? 17. What is the chief region for gold mining?

18. Make a map of Ontario, and name the provinces, states, and waters that are on its boundary.

19. What are the leading seaports of eastern Canada? 20. Which are free from ice throughout the year? 21. What railroad has its Pacific terminal at Prince Rupert? 22. What large cities are connected by the Canadian Pacific Railway?

23. What Canadian cities are on the shores of Lake Ontario? 24. Locate the capital of Canada and name one of its important industries. 25. What advantages of location has Winnipeg? 26. What important product has a large market at this place? 27. Locate St. John.

28. Of what country is Newfoundland a colony? 29. What is the leading industry of Newfoundland? 30. What and where is its chief city?

31. Give an account of Greenland.

Fig. 311
Physical and Political
MEXICO
CENTRAL AMERICA AND WEST INDIES
Scale of Statute Miles
0 100 200 300 400 500 600
400 MILES TO ONE INCH
Capitals of Countries thus: ⊙
Railroads Finished thus ——— Railroads Proposed thus. - - - - -
ELEVATIONS IN FEET
OVER 5000
2000 TO 5000
1000 TO 2000
SEA LEVEL TO 1000
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THE MATTHEWS-NORTHRUP WORKS, BUFFALO, N. Y.
Longitude West from Greenwich
San Diego
Phœnix
Tucson
Bisbee
Nogales
El Paso
Juarez
Hermosillo
Guaymas
Chihuahua
Porfirio Diaz
Jimenez
Monclova
Laredo
Torreon
Montemorelos
Saltillo
Culiacan
La Paz
Durango
Galena
Victoria
Matamoros
Mazatlan
Zacatecas
San Luis Potosi
Tampico
San Blas
Tepic
Aguascalientes
Guadalajara
Leon
Guanajuato
Celaya
Queretaro
Tuxpam
Colima
Morelia
Toluca
México
Puebla
Jalapa
Vera Cruz
Orizaba
Manzanillo
Acapulco
Chilpancingo
Oaxaca
Tehuantepec
Salina Cruz
Gulf of Tehuantepec
Coatzacoalcos
San Juan Bautista
Progreso
Merida
Peninsula of Yucatan
Campeche
Bay of Campeche
Belize
BRITISH HONDURAS (BELIZE)
Gulf of Honduras
Puerto Cortes
Puerto Barrios
Trujillo
HONDURAS
Tegucigalpa
C. Gracias a Dios
Guatemala
San Salvador
Gulf of Fonseca
NICARAGUA
Corinto
Managua
Bluefields
L. Nicaragua
San Juan del Sur
San Juan del Norte (Greytown)
Punta Arenas
Limon
COSTA RICA
San Jose
Isthmus of Panama
Panama Canal
Panama
Gulf of Panama
Gulf of Darien
Cartagena
Barranquilla
Pt. Gallinas
La Guaira
Caracas
L. Maracaibo
Maracaibo
Orinoco R.
VENEZUELA
Medellin
Bogota
COLOMBIA
BRAZIL
SOUTH AMERICA
Memphis
Red R.
Mississippi R.
Atlanta
Charleston
Savannah
Austin
Houston
San Antonio
Galveston
Mobile
New Orleans
Jacksonville
Tampa
Nassau
Key West
C. Sable
Florida Strait
Havana
Matanzas
Cardenas
Santa Clara
Cienfuegos
Camaguey
Santiago de Cuba
Pinar del Rio
C. Catoche
Yucatan Channel
ISLE OF PINES
BAHAMA ISLANDS (Br.)
SAN SALVADOR I.
CAICOS IS. (Br.)
TURKS IS. (Br.)
Windward Passage
Mona Passage
Puerto Plata
Port au Prince
HAITI
DOMINICAN REPUBLIC
Ponce
Santo Domingo
Kingston
JAMAICA (Br.)
GREATER ANTILLES
PORTO RICO (U.S.)
VIRGIN IS. (U.S.)
VIRGIN IS. (Br.)
ST. JOHN (U.S.)
ST. CROIX (U.S.)
ST. THOMAS (U.S.)
LESSER ANTILLES
ANTIGUA (Br.)
GUADELOUPE (Fr.)
Basse Terre
DOMINICA (Br.)
MARIE GALANTE
LEEWARD ISLANDS
St. Pierre
MARTINIQUE (Fr.)
Fort de France
ST. LUCIA
WINDWARD ISLANDS (Br.)
BARBADOS (Br.)
ST. VINCENT (Br.)
Bridgetown
GRENADA (Br.)
St. George's
TOBAGO (Br.)
Port of Spain
TRINIDAD (Br.)
CURAÇAO (Dut.)
BUEN AYRE (Dut.)
BERMUDA IS. (Br.)
CARIBBEAN SEA
ATLANTIC OCEAN
PACIFIC OCEAN
GULF OF MEXICO
UNITED STATES
Tropic of Cancer
C. San Lucas
C. Corrientes
Revillagigedo Is.
Gulf of California
Lower California
Mag. Bay
La Paz Bay
Sierra Madre
Rio Grande
Pecos R.
100°
90°
80°
70°
60°
30°
20°
10°
0°

SOUTHERN COUNTRIES OF NORTH AMERICA

	Area, Sq. Mi.	Population	Capital
Mexico . . .	767,300	15,503,000	Mexico
Brit. Honduras .	8,600	45,000	Belize
Guatemala . .	43,640	2,100,000	Guatemala
Salvador . . .	8,170	1,501,000	San Salvador
Honduras . .	44,276	637,000	Tegucigalpa
Nicaragua . .	49,550	638,000	Managua
Costa Rica . .	18,690	468,000	San Jose
Panama . . .	33,300	401,000	Panama
Cuba	44,000	2,889,000	Havana
Haiti	11,070	2,500,000	Port au Prince
Dominican Rep.	18,750	897,000	Santo Domingo
Jamaica . . .	4,840	858,000	Kingston
Lesser Antilles .	4,905	1,450,000	
Bahama Islands	4,400	53,000	

Map Study.—1. What is the latitude of northern Mexico? Of southern Mexico? 2. What is the latitude of the city of Mexico? 3. Compare with it the latitude of Bombay (see map of Asia); of Manila. 4. What peninsulas form part of Mexico? 5. What countries border Mexico on the southeast? 6. What river is on the northern boundary? 7. What large river of the United States enters the sea through Mexico? 8. What important isthmus is in southern Mexico? 9. What port is southward from Mexico city? 10. What port is eastward from Mexico city? 11. Locate Guadalajara; Puebla; Tampico. 12. Where is Mt. Popocatepetl?

13. Name the seven countries of Central America. 14. Which of these belongs to a European country? 15. Which countries of Central America extend from the Caribbean Sea to the Pacific Ocean? 16. What large cities of the United States are in nearly the same longitude as the city of Panama (Fig. 11)?

17. What are the four principal islands of the West Indies? 18. Give the names of two countries included in one of these. 19. How long is Cuba? (Use scale of miles, Fig. 311.) 20. Locate Havana; Santiago de Cuba; Kingston. 21. Where are the Lesser Antilles? 22. What great river flows into the ocean near the island of Trinidad? 23. Where is Yucatan Channel? Florida Strait? Windward Passage? 24. Where are the Bahama Islands?

MEXICO

298. Physical Features.—The area of Mexico is about one fourth that of the United States. The most northern and the most southern points are about equally distant from the Tropic of Cancer. A narrow lowland runs along the Gulf of Mexico and also along the Pacific Ocean. Above these lowlands, on each side of the country, rise steep and rugged mountain ranges. The country narrows southward, and these mountain ranges come together south of the city of Mexico. Where

Fig. 312. Popocatepetl

the two mountain systems join, volcanic peaks rise to great heights. Their upper parts are covered with snow and ice, even though they are in the Torrid Zone. The highest of these is Orizaba, which rises 18,314 feet above sea level, and is nearly as high as Mt. McKinley. Mt. Popocatepetl is 17,888 feet high (Fig. 312), and several others have altitudes of from 12,000 to 16,000 feet. Orizaba and Popocatepetl still send up hot vapors. Jorullo, a small volcanic mountain, was built up by a violent eruption in 1759.

Between the mountains of eastern and of western Mexico is a vast plateau, an inland basin whose surface averages about 6000 feet above the sea. The city of Mexico is near the southern, narrow end of this high basin. Southeastern Mexico, including Yucatan and the Isthmus of Tehuantepec, is a land of mountains and hills, and of hot, rainy lowlands covered with dense tropical forest.

Fig. 313. Aztec ruins in Mexico

Most of the rivers flow down the mountain slopes on the east and west. They are short, and offer little chance for navigation. The coast line of Mexico is about 6000 miles long, but has few bays and few good harbors.

299. Climate.—Since the country extends over eighteen degrees of latitude, is washed by the sea on both sides, and has such differences of altitude, it has many kinds of climate (Secs. 25–27). In most of Mexico there is a dry season from November until June, and a rainy season during the rest of the year. The northeast trade winds (Sec. 29) blow across Mexico, and hence the slopes facing the Gulf of Mexico are wet. The coastal lowland up to 2000 or 3000 feet is known to Mexicans as the *tierra caliente*, or hot country. The slopes that lead up to the plateau are temperate, but rather warm. The *tierra fria*, or cool zone, is on the plateau; it has a temperate climate, and is so dry that irrigation is, in many places, necessary for raising crops. The west coast, including the peninsula of Lower California, is hot and dry, like southern California and Arizona. The southern lowlands and hills are very hot, and since the distance from ocean to ocean is short, moisture is almost everywhere abundant. The result of the variety in climate is that the soils produce the fruits, grains, and forest trees of both temperate and hot countries.

300. History and People.—People who used many of the arts of civilization had lived in Mexico for hundreds and perhaps for thousands of years before the Europeans came. They were Indians, divided into many tribes, of which the strongest was the great nation of the Aztecs. The Aztecs built fine buildings (Fig. 313), made roads, watered their fields, and carried on commerce. They made articles of clay, silver, gold, cotton, and silk, and lived an orderly life. The country was conquered by the Spanish general Cortes and was subject to Spain for three hundred years. About a hundred years ago Mexico threw off the rule of Spain, and for most of the time since then has been a republic with a government somewhat like that of the United States. There are twenty-eight states, two territories, and a Federal District (Fig. 314).

There are about 15,000,000 people in Mexico, including natives or Indians, the descendants of the Spanish settlers, and half-breeds, or mestizos. The Indians are descended from the Aztecs and other early peoples, and most of them belong to the working or serving class. These are often called peons. They buy a cotton suit for a dollar, a pair of sandals for a dime, and a blanket for a dollar and a half. They are poor, polite, often lazy, and live in filth and ignorance. The mestizos are descended from Spanish people who married natives, and they consider themselves the real Mexicans (Fig. 315). There are now many Americans and Europeans carrying on mining and other kinds of business in the country.

Fig. 314. The political divisions of Mexico

Rude and simple ways of living are found side by side with those of modern life. Some of the farmers still use wooden plows (Fig. 316), and peons called cargadors carry heavy loads on mountain trails. The burro, or donkey, is much used as a beast of burden. There are, however, a number of well-equipped railroads, and the wealthier people travel much in automobiles. The houses of the poor are only a story in height and are built of sun-dried brick or adobe, which stands well because there are no hard frosts. Straw is mixed with the clay in these mud bricks, as in ancient Egypt.

Fig. 315. Mexican women in native costume

Beans and corn are much used for food. The poor soak the corn, grind it with a pestle, and make it into round cakes. These are baked in an open iron pan and are called tortillas. A kind of century plant, or agave, which, like many desert plants, has much juice, supplies a common drink. The heart of the plant is scooped out and the juice gathers in the cavity. This is collected and fermented and makes an intoxicating beverage called pulque. It is the curse of the poorer Mexicans.

Fig. 316. A Mexican plow

U. S. Dept. of Ag., Forest Service

Fig. 317. Mahogany trees

301. Mining.—The Spanish took from the conquered natives great treasures of gold and silver, and for centuries took vast quantities of the precious metals from Mexican mines. A single nugget of silver, found in Mexico in the state of Sonora, weighed 2750 pounds. There are mines in almost every state, and the value of the silver produced has in some years amounted to $70,000,000. There are many gold mines and many copper mines, and near Durango is a great deposit of iron known as Iron Mountain. Quicksilver, lead, zinc, and sulphur also are found. In the production of petroleum Mexico ranks second among the countries of the world. Among the precious stones found in Mexico are onyx, opals, turquoises, topazes, emeralds, agates, and garnets. Hundreds of millions of dollars are invested by Americans and other foreigners in Mexican mines and oil wells.

302. Agriculture.—Corn, wheat, beans, and tobacco are raised in the cooler parts of the country. Corn is the chief crop and is the staff of life to many Mexicans. Almost all tropical fruits are grown, as well as sugar, coffee, cotton, indigo, rice, and the vanilla bean. From the last is taken the flavoring extract we know as vanilla. Henequen is a kind of hemp that is extensively raised in Yucatan. It is used in the United States for making rope, twine, bagging, rugs, and carpets. Some kinds of cactus contain fibers suitable for making paper. Many hammocks are woven in Yucatan, and some are very beautiful and costly. Mahogany (Fig. 317), rosewood, logwood, and other tropical trees abound in the hot parts of Mexico, and their lumber forms one of the valuable exports. Some rubber is produced.

303. Grazing.—The dry plateaus of northern Mexico, like those of the western United States, furnish pasturage for thousands of cattle. The life on the ranches, with their cowboys and round-ups, is similar to that on the plains of the western United States. Some estates are very large and contain many villages and even private railroads. There is also much progress in irrigation in the states of northern Mexico.

Fig. 318. The Cathedral and Plaza, Mexico city

Fig. 319. In the harbor at Vera Cruz, Mexico

304. Cities and Routes of Trade.—Mexico is the capital and the largest city, with about a half million people (Fig. 318). Much of it is well built, and its cathedral is one of the large churches of the New World. The oldest railroad of Mexico is the one between the capital and Vera Cruz (Fig. 319). The ascent from the coast to the plateau is accomplished by skillful engineering. Main lines of railroad extend northward and connect with trunk lines in the United States. Other lines reach Pacific ports and Central America. It is proposed to extend a line through Central America and South America. This is the Inter-Continental Railway, which will give the countries of the two Americas land communication with each other.

Tampico and Vera Cruz are the two important Gulf ports, and among the larger interior cities are Guadalajara, Puebla, and San Luis Potosi.

Review.—1. Describe the great plateau of Mexico. 2. Give the location and height of the principal volcanic peaks. 3. What conditions cause Mexico to have a variety of climate? 4. Where are the wet and the dry regions?

5. To what extent were the Aztecs civilized? 6. What classes of people make up the present population? 7. What is the meaning of each of the following: tierra caliente; peon; mestizo; adobe; tortilla?

8. How much silver is annually produced? 9. What precious stones are found? 10. What is pulque, and how is it produced? 11. Where are the main lines of railroad? 12. What is the "Inter-Continental Railway"?

CENTRAL AMERICA

305. The Republics of Central America. — Until recent years there were in Central America one colony, — British Honduras, — and five small republics, — Guatemala, Honduras, Salvador, Nicaragua, and Costa Rica. To these must now be added the republic of Panama and the Canal Zone. The distance between the Caribbean Sea and the Pacific Ocean is everywhere short, the countries are all less than twenty degrees from the Equator, and the climate is hot. As the land is narrow and in the region of the trade winds, there is a heavy rainfall nearly everywhere. The lowlands of the coast are swampy and unhealthful, while the mountains and hills on the west and southwest are more favorable for human occupation. There are several active volcanoes, and earthquakes are frequent.

Few of the people are educated, and the conditions of life are unsettled. As in other tropical lands, many of the houses are primitive. Coffee, sugar, rubber, and tropical fruits, especially bananas, are extensively raised and are the chief exports (Fig. 320).

Fig. 320. Hauling bananas to the railway, Costa Rica

All these countries are rich in cabinet woods and dyewoods. Like Mexico, these countries were long ruled by Spain, but became independent early in the last century. With education, with sanitary ways of living, and with the development of commerce on the isthmus, they will no doubt become prosperous. Some of the cities are well built. The largest city of Central America is Guatemala.

Fig. 322. Tobacco growing under canvas

THE WEST INDIES

306. The West Indies in General.—The Caribbean Sea is partly separated from the Atlantic Ocean by a long chain of islands. The largest four of these are often called the Greater Antilles. They are Cuba, Haiti, Porto Rico, and Jamaica. The smaller islands are the Lesser Antilles, and most of them lie between Porto Rico and South America. They contain many volcanic formations, and some volcanoes are still active. Coral rocks are abundant: some have been raised high above sea level, and some are now in formation as reefs covered by living corals. Most of the islands are mountainous.

The West Indies are in the belt of the northeast trade winds, and hence their northeast parts often have a heavy rainfall, while the southern and western parts have much less rain and at times need irrigation. Fierce whirling storms, known as *tropical hurricanes*, often sweep the region and do damage on sea and land, and there are frequent earthquakes. As all the islands are south of the Tropic of Cancer, the climate is hot, except as tempered by the sea, and tropical trees and fruits abound, as well as coffee, rice, and tobacco. Lines of fruit steamers ply regularly to many ports of these islands, and of Mexico and Central America, to carry the bananas, oranges, pineapples, and other fruits to the market cities of the United States.

Many of the islands were long under Spanish rule, though none are so governed to-day. Spaniards, half-breeds, and negroes constitute most of the population.

Fig. 321. Cutting sugar cane in Cuba

307. The Greater Antilles.—Cuba is the largest of all the islands. It has plains, hills, and even high mountains, and has rich forests and productive fields. It gained its independence with the aid of the United States in 1898, after three centuries of Spanish control. The United States still holds the right to intervene in order to suppress disorders and protect foreign capital invested in railroads, mining, manufacture, and the sugar and tobacco plantations. Sugar (Fig. 321) and tobacco (Fig. 322) are the leading products of the soil, and the trade in these and other

things is mainly with the United States. Sugar is the largest item, but Havana cigars are even better known.

Iron and copper are found in eastern Cuba, near the chief eastern port, Santiago de Cuba. Havana is the capital and the largest city. It was cleaned and freed from yellow fever by sanitary engineers employed by the United States. A good road was built through the island from west to east.

Haiti is a rugged island east of Cuba. It is divided into two republics: Haiti, with a negro population speaking French, and the Dominican Republic, whose people are of Spanish and negro ancestry and speak Spanish. Santo Domingo, the capital, and Puerto Plata are the chief cities of the Dominican Republic, and Port au Prince is the capital and main city of Haiti.

Porto Rico has already been described (Secs. 266–267).

Jamaica is a crown colony of Great Britain, but its people are nearly all negroes. Sugar production is important, and raw sugar is the leading export. Among the other products and exports are logwood and logwood extract, coconuts, and tropical fruits, especially bananas (Fig. 323). The main trade is with the United States. Ginger, the underground stem of a plant, is produced here. Kingston is the capital and principal seaport.

Fig. 323. Banana plantation, Jamaica

308. The Lesser Antilles and the Bahamas.—The Lesser Antilles belong to several different nations. Under British rule are many islands, including Dominica, St. Lucia, St. Vincent, Grenada, Barbados, and Trinidad. On Trinidad is Pitch Lake, about one half mile across, filled with pitch or bitumen,—the residue of evaporated petroleum,—which supplies the material for most of the asphalt pavements laid in the cities of the United States.

Guadeloupe and Martinique are French colonies. On Martinique is the volcanic Mont Pelee, which became active in 1902. At that time an outburst of suffocating gases swept down upon the city of St. Pierre, and destroyed its entire population of more than 25,000 people.

Curaçao and several smaller islands form a Dutch colony.

St. Thomas, etc., belong to the United States (Sec. 268).

The Bahamas are a group of many small islands north of Cuba. They belong to Great Britain. They are low islands, largely of coral origin. It was on one of them that Columbus made his first landing in 1492. Sponge fishing is one of the industries of these islands, and Nassau is the principal city. Most of the people are negroes.

Review.—1. Give name and location of the only foreign colony of Central America. 2. What region is under the control of the United States? 3. Why has Central America a heavy rainfall? 4. What are the chief products? 5. How do the trade winds affect the rainfall of the West Indies? 6. What special lines of steamships visit many West Indian and Central American ports? 7. How is the population of the islands chiefly made up? 8. What right is held by the United States in reference to Cuba? 9. What are Cuba's leading products? 10. In what direction is Havana from Florida? 11. What country holds the largest share of Cuban trade? 12. Give an account of Jamaica. 13. What calamity happened in Martinique? Give date. 14. What great historical event took place on one of the Bahama Islands? 15. Where is Trinidad? What is its chief product?

Caribbean Sea
CENTRAL AMERICA
Isthmus of Panama
Gulf of Panama
Panama Canal
Colon
Gulf of Cartagena
Barranquilla
Pt. Gallinas
Curaçao (Dutch)
La Guaira
Caracas
Barcelona
Port of Spain
TRINIDAD (British)
Delta of the Orinoco R.
Maracaibo
Valencia
Barquisimeto
Merida
Cucuta
Ciudad Bolivar
Georgetown
Paramaribo
Cayenne
VENEZUELA
BRITISH GUIANA
DUTCH
FRENCH
Medellin
Bucaramanga
Vol. Tolima
Bogota
Cali
COLOMBIA
Popayan
Sierra Pacaraima
Tumac Humac Mts.
Mouths of the Amazon R.
Equator
Quito
Vol. Cotopaxi
Vol. Chimborazo
Guayaquil
ECUADOR
Gulf of Guayaquil
Cuenca
Iquitos
Pt. Parina
Paita
Tabatinga
Manaos
Santarem
Para (Belem)
Maranhao
Ceara
C. St. Roque
Parahiba
Pernambuco (Recife)
Maceio
Falls of the Madeira
Mt. Huascaran
Lima
Callao
PERU
Cuzco
BRAZIL
Guapore R.
Trinidad
Matto Grosso
Cuyaba
Goyaz
Plateau of Matto Grosso
Bahia (São Salvador)
Diamantina
Serra do Espinhaco
L. Titicaca
Vol. Misti
Mt. Sorata
La Paz
Mt. Illimani
Arequipa
Mollendo
Cochabamba
Gruro
Sucre
Santa Cruz
Plateau of
BOLIVIA
Iquique
Bolivia
Potosi
Tarija
Ouro Preto
Campos
Tropic of Capricorn
Concepcion
Campinas
Rio de Janeiro
Antofagasta
Jujuy
Salta
Asuncion
PARAGUAY
São Paulo
Santos
Copiapo
Tucuman
Corrientes
Villa Rica
Blumenau
La Serena
Porto Alegre
Cordoba
Santa Fe
Pelotas
Mt. Aconcagua
Valparaiso
Mendoza
Parana
Rio Grande do Sul
JUAN FERNANDEZ IS. (Chile)
Santiago
Rosario
Buenos Aires
Talca
La Plata
Montevideo
Chillan
Concepcion
Bahia Blanca
Valdivia
San Matias Gulf
CHILOE I.
CHONOS ARCHIPELAGO
St. George Bay
C. Blanco
WELLINGTON I.
Strait of Magellan
FALKLAND IS. (British)
TIERRA DEL FUEGO
Punta Arenas
Cape Horn
SOUTH GEORGIA I. (British)
Fig. 324
Political
SOUTH AMERICA
Scale of Statute Miles
0 100 200 300 400 500 600 700 800 900 1000
600 MILES TO ONE INCH
Capitals of Countries thus: ⊙
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Longitude 60° West from Greenwich

SOUTH AMERICA

	Area, Sq. Mi.	Population	Capital
Brazil	3,300,000	30,645,000	Rio de Janeiro
Paraguay	100,000	1,050,000	Asuncion
Uruguay	69,000	1,495,000	Montevideo
Argentina	1,084,000	8,699,000	Buenos Aires
Chile	293,000	3,755,000	Santiago
Bolivia	440,000	2,890,000	La Paz
Peru	440,000	4,586,000	Lima
Ecuador	118,000	2,000,000	Quito
Colombia	466,000	5,855,000	Bogota
Venezuela	364,000	2,412,000	Caracas
British Guiana	95,000	298,000	Georgetown
Dutch Guiana	50,000	113,000	Paramaribo
French Guiana	30,500	49,000	Cayenne
Falkland Is., etc.	6,570	3,000	

Map Study.—1. What is the latitude of the most northern point of South America? 2. To what country does it belong? 3. Give the name and latitude of the most southern point of South America. 4. To what country does it belong? 5. Give the longitude of the eastern and the western points of the continent, and the countries to which they belong.

Fig. 325. Punta Arenas, the southernmost city of the world

6. Beginning in the north, name in order all the countries that border Brazil. 7. What countries border the Caribbean Sea? The Atlantic Ocean? The Pacific Ocean? 8. What countries have no seacoast?

9. Comparing South and North America, which continent has the more regular coast line? 10. The chief indentations of the South American coast are the mouths of the Amazon and the Plata rivers, and Lake Maracaibo. Locate each of these. 11. Locate the following islands near the South American coast: Falkland, Tierra del Fuego, Juan Fernandez.

12. Counting 69 miles to a degree of latitude, how far do the Andes Mountains extend north and south? 13. Locate the following volcanic peaks: Chimborazo, Cotopaxi, Aconcagua.

14. What countries are partly drained by the Amazon and its tributaries? 15. Using the scale of miles, find the shortest distance from the headwaters of the Amazon to the Pacific coast. 16. Locate Manaos and Para (Brazil). 17. Trace the course of the Orinoco and locate its delta. 18. What is the latitude of the mouth of the Amazon? 19. Trace the course of the following tributaries of the Plata river system: the Uruguay, the Parana, the Paraguay, and the Pilcomayo.

20. Locate the capitals of countries bordering on the Atlantic Ocean. 21. Locate Punta Arenas, and the capitals of all the countries that border the Pacific coast.

PHYSICAL FEATURES

309. Position.—Only a small part of South America is in the Northern Hemisphere, although seven countries lie entirely or partly north of the equator. Cape Horn, at the southern end of South America, is no farther from the Equator than the southern parts of Hudson Bay, hence South America has no cold polar region like that of North America. Its cold climates are found only in the higher parts of the Andes. Punta Arenas (Fig. 325) is the most southern city of the continent. It is about the same distance south of the Equator that London, in the heart of the North Temperate Zone, is north of the Equator.

South America is farther east than most of North America. The western parts of Ecuador and Peru are in about the same longitude

Fig. 326

Physical

SOUTH AMERICA

Scale of Statute Miles

0 100 200 300 400 500 600 700 800 900 1000

600 MILES TO ONE INCH

ELEVATIONS IN FEET	Depths in Fathoms
OVER 5000	Sea Level to 100
2000 TO 5000	100 to 1000
1000 TO 2000	1000 to 2000
SEA LEVEL TO 1000	over 2000

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as southern Florida and Lake Erie. If we look at a globe or at a map of the world (Fig. 350), we see that the Atlantic Ocean between South America and Africa is comparatively narrow.

310. Size.—South America is smaller than North America, but it is nearly twice as large as Europe. It has, however, only about 65,000,000 people, while North America has about 150,000,000. Europe, although so much smaller, has about seven times as many people as South America. South America has much rich soil, and when its lands are improved, can support several times its present population. Except in Argentina, most of the people live near the borders of the continent.

Brazil is larger than the main part of the United States, and Argentina is one third as large. We sometimes think of Peru and Bolivia as small countries, but each of them is about one seventh as large as the United States.

311. Surface.—The Andes Mountains are narrower and higher than the Cordilleras of our own continent. In their central part, however, the Andes are broad and consist of parallel ranges, with high mountain valleys and plateaus. The largest of these plateaus is that of Bolivia (Fig. 326). Several countries extend from the Pacific coast across the Andes to the lowlands and forests on the east of the mountains. Eastern Colombia is in the basins of the Orinoco and Amazon, and eastern Ecuador is in the Amazon basin. In central Peru branches of the Amazon flow 500 miles in a northerly direction, and then turn eastward into Brazil. Central and northern Bolivia is in the basin of the Madeira, a branch of the Amazon. The crest of the Andes forms a national boundary between Chile and Argentina only.

The higher peaks of the Andes rise to altitudes of more than 20,000 feet. Even at the Equator and for hundreds of miles through the Torrid Zone, the tops of the range are in a region of perpetual snow, with numerous glaciers. The lowlands near the coast are hot, the middle heights are temperate, and the upper slopes are frigid, in climate. Several of the highest peaks are volcanoes. Among these are Chimborazo and Cotopaxi in Ecuador, each rising about 20,000 feet above the sea. Aconcagua, in Argentina, rises about 23,000 feet and is the highest mountain in the Western Hemisphere.

Along the Atlantic Ocean in eastern Brazil are mountains which are much lower than the Andes. Many of them have rolling summits covered with a dense forest growth similar to that of the Appalachians in the United States. North of the Amazon is an elevated region called the Guiana Highlands.

Between the Andes on the west and the Brazilian mountains and Guiana Highlands on the east are broad plains, which extend from the mouth of the Orinoco to the southern part of the continent. South America, therefore, like North America, has mountains in the east and in the west, and central lowlands reaching from the northern part of the continent to the southern.

312. Drainage.—The greater part of the central plain lies in the basins of the three great rivers of South America. The northernmost of these is the Orinoco, which has its sources in the Andes and drains much of Colombia and most of Venezuela. It is in a region of heavy rainfall. In consequence its volume is very great, and out of the land waste carried by its waters it has built a large delta opposite the island of Trinidad.

The Amazon is the largest river in the world. The Missouri-Mississippi is longer, but drains less territory and has far less water. The greatest length of the Amazon is about 3500 miles. Ocean ships can ascend the river more than 2000 miles, and smaller steamers can go hundreds of miles farther. At Tabatinga, 2000 miles from its mouth, the Amazon is 1½ miles wide. At the entrance of the Madeira, several hundred miles from

the sea, it is 3 miles wide, and for more than 200 miles it is 50 miles wide. In times of high water vast areas of the Amazon forest are flooded, and many trees stand in deep water. The natives then move to higher ground, or live for a time in boats. The river pours so much water into the Atlantic that the ocean waters are made muddy far out of sight of land.

The third great river system is that of the Plata River. Its northern streams, the Parana and Paraguay, reach into the heart of the continent and are vast rivers in themselves. They drain much of Brazil and Bolivia, all of Paraguay, and northern Argentina. South of the Plata the plains east of the Andes are drained by several shorter rivers.

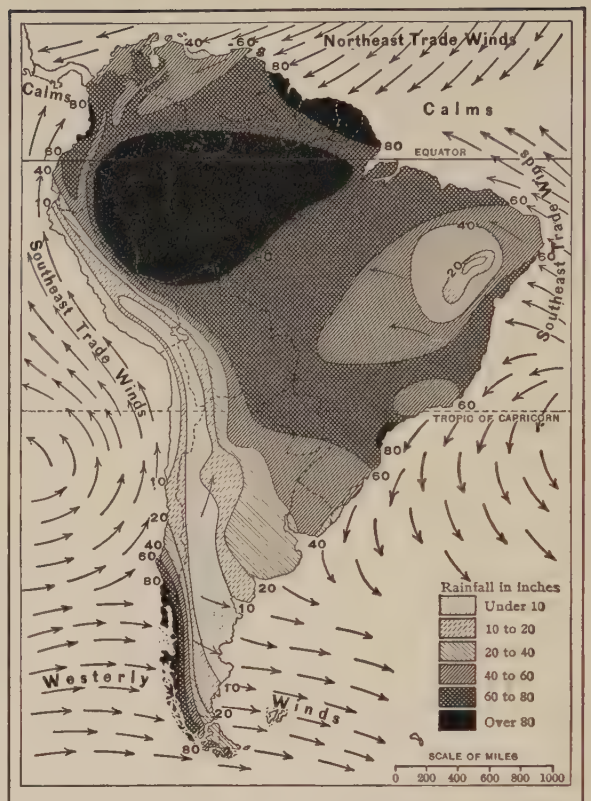

Fig. 327. Annual rainfall and winds in South America

313. Coast Line.—The mouths of the Amazon and Plata are like wide, deep bays, and Lake Maracaibo in Venezuela is really an arm of the sea. As a whole, however, the coast of South America is much less broken than that of North America, and therefore has several thousand miles less of coast line. This condition is not favorable to the growth of coast cities. Several important cities of the west coast have harbors that need to be greatly improved to afford protection for ships in time of storm. Only the coasts of southern Chile and of Tierra del Fuego have headlands and fiords similar to those of Alaska and Labrador. Such coasts furnish excellent harbors, but in South America that part of the continent has so few inhabitants that the harbors are of no practical value.

314. Climate.—The broad part of South America is in the Torrid Zone, where the sun at noon is always nearly overhead; so most of this part of the continent is hot throughout the year. The southern parts of South America are in the Temperate Zone, but they are narrow and are warmed in the winter by winds from the ocean. The continent as a whole is much warmer than North America.

The winds in the broad northern part of South America blow from the Atlantic Ocean—from the northeast in the north and from the southeast farther south (Fig. 327). As these *trade winds* reach the land, and as they cross the Guiana and Brazilian highlands, they are cooled by rising to higher altitudes, and heavy rainfall results. West of these highlands the winds descend, are warmed, and the rainfall diminishes. Here are the comparatively dry grassy plains called the *llanos* in Venezuela and the *campos* in Brazil. Still farther west the trade winds are cooled as they rise on the eastern slopes of the Andes, and the rainfall again is heavy, as it is also near the Equator where the trade winds meet.

On the west there is ample rain along the coasts of Colombia and Ecuador, but the lower slopes and coast plains of western Peru and northern Chile are a desert. The air of the trade winds has lost its moisture, and

as it descends the west slope of the Andes, it becomes warmer and is able to receive moisture instead of giving it off. This strip of lowland is one of the driest parts of the world, and in some places several years elapse between rains.

In the southern part of the continent, however, the Pacific coast has much rain, and the dry lands are east of the Andes, stretching several hundred miles, from central to southern Argentina. In these latitudes the prevailing winds are from the northwest. In southern Chile the cooling of the air due to the increase of elevation, and the rainfall, are therefore in the west. The eastern mountain slope and the plains to the east of the mountains are much drier. It is on account of the difference in the direction of the prevailing winds that northeastern Argentina is wet, while western and southern Argentina are dry.

Between the belt of northeast trade winds in northern South America, and the belt of southeast trade winds in central South America, is a belt of calms, heat, and abundant rain. In our summer time this rain belt is some distance north of the Equator. In our winter it has moved to the south of the Equator. Consequently in the llanos and campos of the interior, and on the west coast of Colombia and Ecuador, the year is divided into a rainy season and a dry season. The northward and southward movement of this rain belt also explains why some parts of South America near the Equator have two rainy seasons and two dry seasons each year.

Review.—1. What parts of the United States are in the same longitude as Ecuador? 2. Compare South America with North America and Europe in size and population. 3. What countries are partly drained by the Amazon and its branches? 4. Give the names and location of three volcanic peaks. 5. Give location and other facts about Tabatinga. 6. Compare the temperature of North America with that of South America and give reasons for the difference. 7. What part of South America is swept by the northeast trade winds? By the southeast trade winds? 8. What parts of South America are very dry? Why? 9. Where are the regions that have two wet and two dry seasons?

PLANTS AND ANIMALS

315. Forests and Grasslands.—Where the temperature is high and the rainfall large, dense tropical forests grow. This is especially true in the central parts of the Amazon basin. Since the eastern highlands of the Guianas and Brazil are in the trade wind belt, they also are moist and covered with forests. The same is true of the eastern slopes of the northern Andes. Because of the prevailing westerly winds, the western parts of central and southern Chile also have a heavy growth of trees. In the Amazon basin the rainfall is heavy and the slope of the land so gentle that the water drains into the streams very slowly. Here is one of the most luxuriant of all tropical forests (Fig. 328), and the large trees, the undergrowth, and the vines make a network of plant life so dense that the explorer must cut a path before he can make his way through the forest.

The llanos of Venezuela, the pampas of Argentina, and a part of the campos of Brazil,

Fig. 328. Forest along the Amazon River

are grasslands in regions of moderate or small rainfall, as are the prairies and western plains of the United States.

316. **Animals.**—Many of the native animals of South America are very different from those found in other parts of the world. This is partly due to the fact that the position of South America is such that the animals of other continents could not easily reach it. The continent is joined to North America by the narrow Isthmus of Panama. Oceans separate it from all the other continents, and there are few islands in the neighboring waters.

Fig. 329. Jaguar

In western South America is found the llama, an animal somewhat like a small camel, but without a hump. It has a head like a camel's, a body like that of a sheep, and feet and legs like those of a deer. It was tamed and used by the Indians of the Andes as a domestic animal, and is still used as a beast of burden. The flesh, hides, and wool are useful, so that these animals to a degree take the place of horses, cattle, and sheep. The alpaca is a similar animal, with especially fine wool. The llama and alpaca no longer exist in a wild state, but the vicuña, which is like them, is found wild in some parts of South America.

The tapir is a large animal that is related to the rhinoceros, but does not, like the latter, have a horn on its nose, nor does it grow to be so large. The two animals are alike in habit; they are shy, and wander at night, feeding on plants and bathing in the streams. The jaguar (Fig. 329) is a catlike animal, large and powerful, resembling the tiger of Asia and the leopard of Africa. It ranges from Mexico to the southern part of South America, and feeds on other animals. A strange quadruped is the armadillo, which is covered with a strong bony case or shell. It can run rapidly, however, and has strong claws by which it buries itself in the earth when in danger.

Like other tropical lands, the warm parts of the continent have many poisonous insects and serpents, and many brilliant and strange birds. The condor (Fig. 330) is the largest of birds. When its wings are spread, they measure nine or ten feet from tip to tip. It can kill and eat a sheep, goat, deer, or dog. The condor nests in the high Andes, and its young are nearly two years old before they can fly. The rhea is a large running bird resembling an ostrich. Birds of beautiful plumage and a great variety of brilliantly colored insects are found in the tropical forests, and numerous monkeys climb and chatter in the thick tree tops.

Fig. 330. Condor

Horses, cattle, and sheep have been brought in modern times from other lands to South America. This continent, however, has not furnished other parts of the world with any useful animals.

Fig. 331. Ruins of an ancient Peruvian city

PEOPLE AND INDUSTRIES

317. History.—In the years following the first voyage of Columbus, the shores of South America were discovered by him and by other explorers from Spain and Portugal, and thus these two kingdoms gained control of almost the entire continent. They found everywhere, as in North America, native Indian tribes. Some of the Indians were savages, but others had developed many of the arts of civilized people.

The most advanced natives belonged to the empire of the Incas, whose capital was Cuzco, an ancient city among the mountains of Peru. Their dominions covered most of Ecuador and Peru, and parts of Bolivia and Chile. In the course of hundreds of years these people had developed skill in building substantial houses and cities (Fig. 331). They made strong forts and splendid temples, quarrying large blocks of stone and dressing them so that they fitted each other perfectly when laid into a wall. They mined much gold and silver, which they used in adorning their buildings and in making ornaments of many kinds.

The Incas, and the many tribes under their rule, were expert in tilling the soil, and, as much of their land was along the dry western coast, they dug canals and irrigated their fields. They also made terraces on the steep slopes by building walls to hold the soil, and they raised potatoes, corn, and cotton. They found the potatoes and corn as wild plants, developed them by cultivation, and thus gave to the world two of its most important foods. They used the llama as a beast of burden. They built roads and sent messages by swift runners, but they did not have a written language.

The Spanish explorer Pizarro, with a small party of followers, invaded the country in 1532. With the aid of firearms, and by means of treachery, they captured and then killed the king of the Incas, stole their gold, and conquered the land for Spain, under whose rule most of South America remained for nearly three hundred years. Brazil, however, belonged to Portugal, and its conquerors and colonists were from that country.

About one hundred years ago, after several wars, the peoples of South America freed themselves from foreign rule. The Spanish colonies became republics, somewhat like the United States. For many years Brazil was ruled by an emperor, but this country also at last adopted a republican form of government. Only the three Guianas now remain under foreign rule.

318. People.—The people of South America are of many kinds, chiefly Indians (Fig. 332), Spaniards, Portuguese, and mestizos, or mixed races, with some negroes, whose ancestors were brought from Africa as slaves. The negroes are most numerous in Brazil. In later years Englishmen, Germans, Italians, and North Americans have gone to South America, but their numbers are small compared with the Europeans who have found new homes in North America.

Fig. 332. Indians of South America

The Panama Canal facilitates travel and commerce between North and South America. The Inter-Continental Railway also, when constructed, will promote trade among all the countries of both continents.

The republics of North and South America have organized the Pan-American Union, whose object is to promote friendly commercial relations. Its central office is a fine building in Washington (Fig. 333).

319. Products. — In North America the temperate regions are much larger than the tropical. In South America the opposite is true. The southern, or temperate, parts raise wheat and corn, and furnish wool, hides, beef and dairy products. The northern and central countries produce rubber, cabinet woods, dyewoods, quinine, many tropical fruits, coffee, and cacao, from which chocolate is made. Among the most valuable commercial products of tropical South America are coffee and rubber (Secs. 321, 322).

All the countries of the Andes produce silver, gold, and copper. Nitrate, used extensively as a fertilizer, is found in northern Chile; and tin in Bolivia. There is little mining of coal and iron, and for this reason railroad iron, rolling stock, bridge materials, and machinery of all kinds are mainly imported from the United States and other countries.

320. Commerce. — The commerce of South America, which is mainly with the United States and Europe, is rapidly growing. A very large part of the coffee and rubber is taken by the United States, while most of the corn, wheat, flour, meat, and dairy products of Argentina go to Europe, where countries like Great Britain have large populations and not enough farm lands on which to raise their food. A large part of the trade with Europe is with Great Britain, Germany, France, and Italy.

South America is so far east (Sec. 309) that most of the ports of eastern South America are almost as near to the leading ports of Europe as they are to those of the United States. Better ships run between South America and Europe than between South America and North America.

Fig. 333. The home of the Pan-American Union in Washington

Since the completion of the Panama Canal much of the trade of the west coast makes use of that route. European trading nations have sought to gain control of the South American trade; and familiarity with the Spanish, Portuguese, and French languages has given them an advantage. We are now, however, more interested than formerly in South American trade. Our commercial travelers are beginning to learn the languages of the people, and American capital is being invested in South American railroads and mines.

The Panama Canal reduces the sailing distance between New York or New Orleans and the ports of Peru, Chile, and Ecuador by thousands of miles. From Callao to New York by the Cape Horn route is 10,700 miles. By the Panama route the distance is only 3600 miles. Better and swifter ships are being put into service, and trade between the United States and South American nations is steadily increasing.

For a great continent, South America has few railroads, but railroad building has progressed rapidly during recent years. The development of railroads will make it possible to export more of the produce of the plantations, the forests, and the mines.

Review. — 1. Describe the Amazon forest. 2. What are the llanos and pampas, and where are they found? 3. Why has South America some animals peculiar to itself? 4. Describe the llama, the tapir, the armadillo, the condor, and the rhea.

5. Give an account of the Incas. 6. To what nationalities do the South American people belong? 7. What is the Pan-American Union? 8. What are the most important tropical products of South America? 9. What part of South America is best supplied with minerals? 10. What countries have a large trade with South America? 11. How much does the Panama Canal shorten the sailing distance between New York and Callao?

COFFEE AND RUBBER

321. Coffee.—Coffee, like cotton, is raised in warm countries. The plant is said to have derived its name from Kaffa, in Abyssinia, but it was first extensively cultivated in Arabia, where Mocha (the present Mokha) gave its name to a superior kind of coffee. In 1690 a Dutchman from Holland took some of the plants to the island of Java. Later, coffee plants were carried to the West Indies, to Brazil, and to the Philippine Islands.

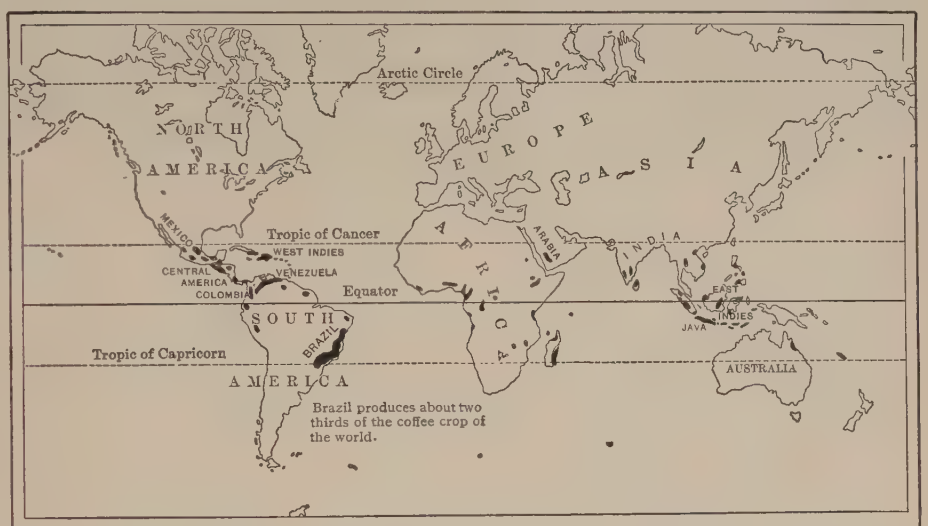

Fig. 334. Coffee-producing regions of the world

Brazil now grows two thirds of the world's supply of coffee, but the crop is important also in Venezuela, Colombia, Central America, Mexico, and the islands of Haiti and Porto Rico. In the Old World coffee is grown in the East Indies, British India, Arabia, and east Africa (Fig. 334). In Brazil most of the coffee is raised in four southern states near the ocean. The principal port is Santos,

Fig. 335. Drying coffee, Brazil. The small railroads serve for carrying the coffee

from which many ships carry the coffee to the countries of the Northern Hemisphere. The United States uses much more coffee than any other country.

The plant grows to a height of from 14 to 18 feet, but when cultivated it is pruned to 6 or 8 feet. Its red berries grow in clusters, and each berry contains two seeds, or coffee "beans," surrounded by pulp and by inner and outer skins. The beans are separated from the pulp by drying (Fig. 335) or by a process in which water is used.

The coffee plant needs high ground, with rich but porous and well-drained soil, some shade when it is young, and plenty of water. Within two hundred years the raising and drinking of coffee have spread to many lands in both hemispheres, like the production and use of potatoes and corn.

Fig. 336. Carrying coffee on board a ship at Santos

322. Rubber.—The discoverers of South America found some of the Indians playing with balls made of crude rubber. The Indians also made shoes and bottles of this material. The name *rubber* was finally given to it when an English chemist suggested that it was good for erasing pencil marks; and it was called *India* rubber because the first rubber used in England came from India.

There are many varieties of rubber trees, which flourish best in low, wet ground, and under shade.

The rubber collectors in Brazil cut their way through the dense forest and tap the trees (Fig. 337), which yield a milky juice. This is taken to the camp, and thickened in the smoke and heat of a fire of palm nuts. It is then "crude rubber" (Fig. 338), and is brought down to Manaos in the interior, or to Para, near the mouth of the Amazon. Para is a large city which exports little but rubber.

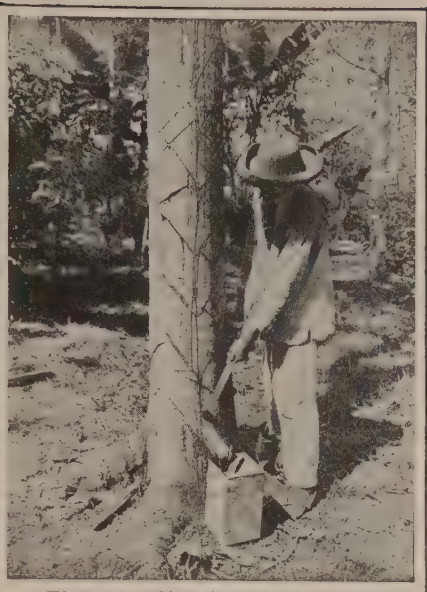

Fig. 337. Tapping a rubber tree

The United States, Great Britain, France, Canada, and Italy are the countries that lead in the consumption of rubber.

All the tropical countries of South America produce rubber, and much of the crop from Bolivia, Peru, and Ecuador, as well as from Brazil, goes down the Amazon to Para, for export. Central America and southern Mexico are rubber regions, and in the Old World, rubber is produced in the Congo region in Africa, in Ceylon, the East Indies, and Indo-China. Most of the world's supply of rubber is produced from cultivated trees in the oriental countries, especially in the Malay Peninsula and Ceylon, but some rubber plantations have been started in other lands.

The crude rubber is changed by various processes, especially by mixing with sulphur, so that it will stretch when cold and not stick when hot. It is also made into hard rubber, such as is used in combs. Rubber is used for erasers, in garments and footwear, for insulation of electric wires, for hose, dental and surgical goods, mats, cushions, toys, paint, for balls of many kinds, and for carriage and automobile tires. By taking care in tapping the trees and by increasing the number of rubber plantations, the world can always have enough of this important substance.

Fig. 338. Making crude rubber by smoking rubber sap

Review.—1. What country raises the greater part of the world's coffee? 2. What other countries are important in coffee culture? 3. Describe the plant and the coffee berry. 4. What country offers the largest market for coffee?

5. How did the natives of South America make use of rubber? 6. How is the crude rubber obtained? 7. What cities are important in the rubber trade? 8. What South American countries yield rubber? What North American countries? What countries in the Eastern Hemisphere? 9. Name some of the uses of rubber. 10. What countries use most of it? 11. How can the supply of rubber be maintained?

Fig. 339. Physical and Political
SOUTH AMERICA
Eastern Portion
BRAZIL
(For Southern Brazil, see Fig. 341)
Scale of Statute Miles
0 50 100 200 300 400
350 MILES TO ONE INCH
Capitals of Countries: ⊙
Railroads in operation:
Proposed Railroads:
COPYRIGHT, BY AMERICAN BOOK COMPANY
60° Longitude West from Greenwich
ATLANTIC OCEAN
PACIFIC OCEAN
VENEZUELA
COLOMBIA
BRITISH GUIANA
DUTCH GUIANA
FRENCH GUIANA
BOLIVIA
PARAGUAY
ARGENTINA
CHILE
PERU
BRAZIL
Bogota
Cayenne
Counani
Mapa
Pedro II
Macapa
Mouths of the Amazon River
Rio Para
Para (Belem)
Bragança
Gurupy
Tury-assu
Alcantara
Maranhao (S. Luiz)
Camocim
Acaracu
Trahiry
Ceara (Fortaleza)
Cascavel
Aracaty
Mossoro
Parnahiba
Viana
Caxias
Therezina
Carolina
Chapada
Conceicão
Praia da Rainha
Piranhacuara
Itaituba
Uixituba
Caldeira
Borba
Manaos
Amazon
Rio Negro
Rio Madeira
Rio Purus
Rio Yapura
Rio Javary
Rio Jutay
Rio Juruá
Rio Tapajoz
Rio Xingu
Rio Tocantins
Rio Araguaya
Rio Grande
Rio Paraguay
Rio Parana
Rio Pilcomayo
Rio Beni
Rio Mamore
Rio Guaporé
Rio Itenez
Rio Jamary
Rio Acre
Rio Javari
Rio Iça
Rio Napo
Rio Putumayo
Rio Caqueta
Rio Inirida
Rio Guaviare
Rio Vichada
Rio Meta
Rio Orinoco
Rio Caroni
Rio Paragua
Rio Branco
Rio Uraricoera
Rio Tacutu
Rio Mahu
Rio Corentyne
Rio Maroni
Rio Oyapok
Rio Jary
Rio Curuá
Rio Trombetas
Rio Nhamunda
Rio Tapajos
Rio Gurupy
Rio Moju
Rio Capim
Rio Guamá
Rio Pindaré
Rio Mearim
Rio Itapicurú
Rio Parnahyba
Rio Gurgueia
Rio Piauhy
Rio Jaguaribe
Rio Acaraú
Rio Mossoro
Rio Apody
Rio Assu
Rio Potengy
Rio Parahyba
Rio Goyanna
Rio Una
Rio Pardo
Rio Jequitinhonha
Rio Doce
Rio Grande do Sul
Rio Jacuhy
Rio Taquary
Rio Caby
Rio Ivahy
Rio Negro
Rio Uruguay
Rio Pelotas
Rio Iguassu
Rio Tibagy
Rio Ivahy
Rio Paranapanema
Rio Tieté
Rio Grande
Rio Sapucahy
Rio Mogy Guassu
Rio Pardo
Rio Verde
Rio Paraiba
Rio Parahyba do Sul
Rio Muriahé
Rio Pomba
Rio Preto
Rio Parahybuna
Rio Parahyba
Rio Parahybuna
Rio Piabanha
Rio Macahé
Rio Macahé
Rio Maricá
Rio Guandu
Rio Itabapoana
Rio Itapemirim
Rio Benevente
Rio Jucú
Rio Santa Maria
Rio Doce
Rio Piracicaba
Rio Tieté
Rio Sorocaba
Rio Ribeira
Rio Juquiá
Rio Itapocu
Rio Cubatão
Rio Itajahy
Rio Tubarão
Rio Araranguá
Rio Mampituba

BRAZIL

323. Description of Brazil. — Brazil is more than five sixths as large as Europe, but Europe has nearly fifteen times as many people as Brazil. In Brazil there are on an average only nine or ten persons for each square mile. Portuguese is the chief language of the country. Most of the people live near the coast or in a few of the southern states, and much of the interior is almost uninhabited.

Nearly all of Brazil is within the tropics, where the coldest and warmest months of the year differ in temperature only 5° or 10°. The country extends to about 33° south latitude, however, and in the southern states frosts are common in winter, and there are occasional snowstorms.

Northern and western Brazil are drained by the Amazon and its tributaries, and much of southern Brazil by the Plata system, while southern and eastern Brazil have many streams that do not unite in a single system but reach the sea independently. Of these the São Francisco is the largest.

South of the Amazon plain, the campos occupy the greater part of the country. They are rolling plains, in some places bearing grasses only, in others scrubby trees, and in a few places dense forests.

324. Products. — The forests along the Amazon and on the higher lands have a great variety of woods. As many as two hundred kinds were shown in an exposition at Rio de Janeiro. It is from the Brazil wood, which affords a red dye, that the country gets its name. Of other forest products rubber is the most important, and in addition there are cacao, vanilla, sarsaparilla, various dyes, and Brazil nuts.

Cacao seeds, exported in large quantities to the United States, Great Britain, and other countries, are the material from which chocolate and cocoa are made. Many cacao trees grow in the Amazon Valley and along the coast (Fig. 597). They require shade, and much warmth and moisture. The largest crop is grown in regions protected from strong winds, because the seed pods are large and are easily broken off the trunk and main branches to which they are attached. In the production of cacao Brazil outranks all other countries except the Gold Coast of Africa.

Fig. 340. Rio de Janeiro

In southern Brazil and in Paraguay are ilex trees, whose leaves make maté, or Paraguay tea. It is prepared like ordinary tea, and is a stimulating drink, though hardly suited to our taste. Maté leaves are exported to Argentina, Chile, and Peru.

In the grasslands of central and southern Brazil the cattle industries are important, and hides and meat are exported. German and Italian settlers have introduced modern methods of agriculture, and have established cotton and other manufactures.

Among the agricultural products of Brazil are coffee, corn, manioc, cotton, and sugar. Manioc is grown for its roots, from which farina and tapioca are made. From these roots the natives prepare a flour from which they make a sweetish kind of bread. The juice of some manioc plants is poisonous, and must be carefully pressed out when the roots are ground to make the flour. Coffee is the largest export, and sugar ranks second.

325. Cities.—There are few large cities, and most of them are on the Atlantic coast. The greatest of them is Rio de Janeiro, the capital (Fig. 340). It is the second in size of

65° Longitude West 60° from Greenwich
PERU
BOLIVIA
PARAGUAY
BRAZIL
URUGUAY
ARGENTINA
CHILE
Lake Titicaca 12,645
Mt. Sorata 21,500
Mt. Illimani 21,030
Vol. Misti 19,250
Vol. Sahama 21,000
L. Aullagas
Arequipa
La Paz
Puno
Mollendo
Moquegua
Tacna
Arica
Cochabamba
Oruro
Coloquechaca
Santa Cruz
Sucre 5000
Potosi
Camargo
Huanchaca
Pisagua
Iquique
Tocopilla
Cobija
Tupiza
Tarija
Antofagasta
San Antonio de los Cobres
Tropic of Capricorn
Jujuy
Salta
Taltal
Copiapo
Vol. Copiapo
Tucuman
Vallenar
Catamarca
La Serena
Coquimbo
Ovalle
Rioja
San Juan
Esperanza
Concordia
Cordoba
Santa Fe
Parana
Salto
Paysandu
Mendoza
San Luis
Rio Cuarto
Rosario
San Nicolas
Mercedes
Durazno
San Jose
Florida
Minas
Rocha
Buenos Aires
Chivilcoy
Bragado
La Plata
Montevideo
Saladillo
Dolores
Azul
Tandil
Mar del Plata
C. Corrientes
Bahia Blanca
Blanca Bay
Valdivia
Union
Osorno
Puerto Montt
Ancud
Castro
CHILOE I.
Viedma
San Matias Gulf
Valdez Peninsula
Puerto Madryn
Rawson
CHONOS ARCHIPELAGO
St. George Bay
Taytao Peninsula
Gulf of Penas
C. Blanco
Puerto Deseado
CAMPANA I.
WELLINGTON I.
Santa Cruz
HANOVER I.
QUEEN ADELAIDE ARCHIPELAGO
DESOLATION I.
SANTA INES I.
CLARENCE I.
Punta Arenas
TIERRA DEL FUEGO
C. San Diego
STATEN I.
HOSTE I.
WOLLASTON I.
Cape Horn
FALKLAND IS. (British)
Stanley
WEST I.
EAST I.
C. Virgin
Strait of Magellan
Caceres
San Ignacio
San Jose
Corumba
Matto Grosso Plateau
Charayes Swamp
Pyrenopolis
Goyaz
Entre Rios
Catalao
Paracatu
Bagagem
Uberaba
Itapura
Formigas
Ribeirao Preto
Campanha
Amparo
Piracicaba
Campinas
Jundiahy
Taubate
Soracaba
Sao Paulo
Santos
Castro
Ponta Grossa
Curitiba
Antonina
Paranagua
S. Francisco
Joinville
Itajahy
Florianopolis
SANTA CATHARINA I.
Laguna
Blumenau
Oran
Concepcion
San Pedro
Asuncion
Villa Rica
Villa Pilar
Cazapa
Formosa
Resistencia
Corrientes
Posadas
Encarnacion
Uruguayana
Rio Pardo
Porto Alegre
São Leopoldo
Livramento
L. Patos
Bage
Pelotas
Rio Grande do Sul
Jaguarao
L. Mirim
Melo
Concepcion
Gualeguaychu
Gualeguay
Rio Negro
Colorado R.
Rio Chubut
Chubut R.
Rio Deseado
Rio Santa Cruz
L. Buenos Aires
L. Viedma
L. Argentino
L. Nahuel Huapi
Mt. Aconcagua 23,091
Rio Salado
Rio Dulce
Rio Paraguay
Rio Parana
Rio Uruguay
Rio Iguassu
Guaira Falls
Victoria Falls
Rio Pilcomayo
Rio Bermejo
Rio Salado
Rio Tercero
Rio Quinto
Rio Atuel
Rio Diamante
Rio Mendoza
Rio Tunuyan
Rio Colorado
Rio Negro
Rio Limay
Rio Neuquen
Rio Grande
Rio Desaguadero
Rio Loa
Rio Vilama
Rio Aulagas
Rio Pilcomayo
Rio Paraguay
Rio Apa
Rio Parana
Rio Uruguay
Rio Iguassu
Rio Ivinheima
Rio Pardo
Rio Grande
Rio Tiete
Rio Paranapanema
Rio Sao Francisco
Rio Doce
Rio Paraiba
Rio Itabapoana
Rio Itapemirim
Rio Mucury
Rio Jequitinhonha
Rio Pardo
Rio Grande
Rio Tocantins
Rio Araguaya
Rio Xingu
Rio Tapajoz
Rio Madeira
Rio Purus
Rio Juruena
Rio Guapore
Rio Jauru
Rio Paraguay
Rio Negro
Rio Branco
Rio Trombetas
Rio Jamundas
Rio Nhamunda

South American cities, and has a splendid harbor. Other busy cities are São Paulo, in the coffee district, and its seaport, Santos (Sec. 321). On the coast between Para and Rio de Janeiro are Pernambuco and Bahia, which export cotton, tobacco, and sugar.

Review.—1. What is the range of temperature over most of Brazil? 2. Why is the southern part of Brazil its coldest region? 3. Describe the campos. 4. What are the chief products of Brazil? 5. What is maté? What countries produce it? 6. Locate the chief seaports of Brazil.

COUNTRIES OF THE PLATA BASIN

326. Argentina.—Argentina is more than 2000 miles long from the border of Bolivia to Tierra del Fuego. On the west it rises to the crest of the Andes, and on the east it is bounded by Paraguay, Brazil, Uruguay, and the Atlantic Ocean. It occupies more than half of the Temperate Zone in South America, and its products are somewhat like those of the United States. The people are very progressive, and Argentina has the largest immigration of all the countries of South America. About one seventh of the population are Italians. Outside of Italy, only our own land has more Italian people than Argentina.

The country is a great plain sloping from the Andes toward the rivers of the Plata system and toward the Atlantic. The central parts of the country around Buenos Aires are known as the *pampas*. They are like the prairies and plains of the Mississippi basin. In the east they are well watered, and raise much grain. In the west they are drier and are used for grazing millions of cattle and sheep.

To the southward are the dry and cool plains of Patagonia (Sec. 314). Northward the country extends within the Torrid Zone, and in the eastern part receives abundant rain from the southeast trade winds. Here are tropical forests, and here also other growths of hot lands abound.

Agriculture and grazing are the great industries of the country. Argentina, like the United States and Canada, raises and exports much wheat. It is sent from Buenos Aires and Rosario, and most of it goes to Great Britain and other European countries to help feed the dense populations of the great manufacturing centers. As the wheat lands of Argentina are more fully occupied and better methods of cultivation adopted, the annual yield may be largely increased. This increased supply will be needed in European markets to take the place of wheat and flour from the United States, more and more of which is being used at home. Argentina also raises corn, and exports more of this grain than any other country. In recent years much corn is being used, as in the United States, for fattening cattle. Argentina has taken first place in raising flaxseed. Grapes and wine are produced on a large scale in the western parts, and sugar cane is grown in the tropical region about Tucuman.

Fig. 342. Hauling grain to market, Argentina

The grassy plains support herds of cattle and flocks of sheep. Beef and mutton are exported in large quantities, the meat being frozen, chilled, salted, or dried. Other cattle products are hides, tallow, and butter. All of these products find a ready sale in European markets, and some of them are now being sent to the United States in large quantities. The beef is needed because our own supply is no longer sufficient for our population, and the hides are needed for use in the manufacture of shoes. Argentina has many sheep, and having a small population, it contributes largely to the world's supply of wool and mutton.

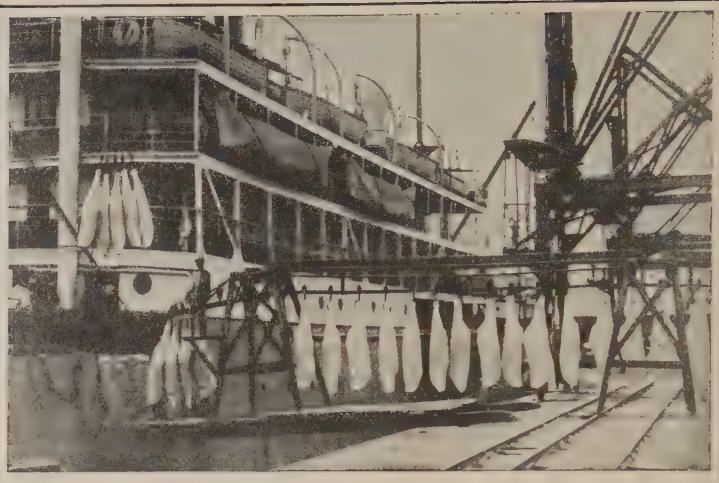

Fig. 343. Loading beef in Argentina

Although there are some textile and paper mills, the chief manufacturing industries are of a very simple kind. They include meat freezing, butter making, flour milling, and brewing. Argentina will probably always be an agricultural rather than a manufacturing country, because there is very little iron or coal to support manufacturing industries. Quebracho wood and its extract, used for tanning, are important exports.

Near Jujuy, in the northern part of the country, there are mines that yield silver, gold, copper, and quicksilver.

Buenos Aires is the capital and has about 1,700,000 people. It is the largest city in the Southern Hemisphere, and the largest city in the world in which Spanish is the prevailing language. It is the chief center of Argentine railroads, and communicates by several lines of steamships with European countries. One of the principal railroads is a trunk line running northward from Buenos Aires to Rosario, Tucuman, and Jujuy. This line extends also beyond the boundary of Bolivia. Another line, the Trans-Andine Railway, runs westward, and by a tunnel crosses the Andes and connects Argentina and Chile. Another railroad extends from the capital about 800 miles to the southwest. One line has 175 miles without a curve.

Many of the ships make " triangular voyages "; that is, they go from the United States to the Plata River, then to Europe with meat, grain, and wool, and back to the United States. Other vessels sometimes go from Europe to Brazil, take on rubber or coffee, carry these cargoes to the United States, and there load again for European ports. By following these routes the ships are usually sure to get cargoes for the round trip.

327. Uruguay and Paraguay. — Uruguay and Paraguay are small countries east of northern Argentina. They are crossed by the southeast trade winds and have abundant rainfall.

The raising of cattle and sheep is the largest industry of Uruguay. The capital is Montevideo, on the broad mouth of the Plata River.

Paraguay is one of the two South American countries without a seacoast. But it is on the Parana, a great and navigable river, and it is expected that ocean-going steamships will soon be able to call at Asuncion, the capital. Asuncion is now reached by rail from Buenos Aires. Paraguay has large forests of quebracho and other trees, but much of the land is like the campos of Brazil.

Among the chief exports are hides, Paraguay tea, quebracho extract, and oranges, both wild and cultivated. So abundant is the supply of oranges, however, that the greater number are eaten by birds or monkeys or lie on the ground and decay. Tobacco and cotton also are raised. Paraguay women are skillful in the making of lace.

Review.—1. Describe the surface of Argentina. 2. Describe the distribution of rainfall and give reasons. 3. What are the chief products of the farms in Argentina? Why are these exported to European countries? 4. What exports are provided by the grazing industries? To what countries are they sent? Why? 5. What kinds of manufactures are found in Argentina? 6. Give location and other facts about Buenos Aires. 7. Describe three great lines of railroad in Argentina. 8. What is meant by "triangular" voyages of ships that visit the ports of Brazil and Argentina? 9. What is the chief industry of Uruguay? 10. What means of communication with foreign lands has Paraguay?

COUNTRIES OF THE ANDES

328. Chile.—Chile lies on the west slope of the Andes, and the nearness of the mountains to the coast makes the country very narrow. It is, however, more than 2500 miles long (Fig. 341). For several hundred miles along the coast there is a lower range of mountains that shuts off the interior as a valley between itself and the Andes. This Central Valley includes the best soil and the largest centers of population, among which is Santiago, the capital.

The northern part of Chile is within the tropics; the central and southern parts are in the Temperate Zone. For this reason, and because the land varies in altitude from sea level to the summits of the Andes, there is a great variety of climate. The reasons why northern Chile is dry and southern Chile is wet have already been given (Sec. 314).

Chile, like Argentina, is known as a progressive nation. It had the first railroad on the continent, and is now active in three great branches of industry: mining, farming, and manufacture. Of these, mining is the most important, and the most valuable deposits are the beds of nitrate, a substance used in fertilizers and in the manufacture of explosives. The nitrate is found in northern Chile. It is the leading export of the country and an important source of governmental revenue. Chile is also an important producer of copper, and has coal, gold, silver, and other mines.

Agriculture is the second interest in Chile. In the northern dry region irrigation is necessary. In the moist and cooler parts all the grains and fruits commonly produced in temperate latitudes are raised, and some wheat is exported. The cattle and sheep industries also are of considerable importance. Trade with the United States is increasing, and is favored by the opening of the Panama Canal.

Fig. 344. Packing nitrate in bags, Chile

Valparaiso is the principal port and is the gateway to the capital, Santiago, a city of about 500,000 people. Iquique, the second port of Chile, is the principal shipping point for the nitrate. Punta Arenas, the most southern city of the world, is on the Strait of Magellan (Fig. 325). It is a *free port*, no duties being collected on exports or imports.

CARIBBEAN SEA
ATLANTIC OCEAN
PACIFIC OCEAN
ELEVATIONS IN FEET
OVER 5000
2000 TO 5000
1000 TO 2000
500 TO 1000
SEA LEVEL TO 500
VENEZUELA
COLOMBIA
ECUADOR
PERU
BOLIVIA
BRAZIL
PARAGUAY
ARGENTINA
CHILE
BRITISH GUIANA
DUTCH GUIANA
FRENCH GUIANA
Fig. 345. Physical and Political
SOUTH AMERICA
Northern and Western Portion
COLOMBIA, VENEZUELA AND THE GUIANAS
ECUADOR, PERU AND BOLIVIA
Scale of Statute Miles
0 50 100 200 300 400
350 MILES TO ONE INCH
Capitals of Countries: ⊙
Railroads in operation:
Proposed Railroads:
COPYRIGHT, BY AMERICAN BOOK COMPANY
THE MATTHEWS-NORTHRUP WORKS, BUFFALO
COLON ARCHIPELAGO (Galapagos Is.)
To Ecuador
Equator
FERNANDINA I.
ISABELLA I.
S. SALVADOR I.
SANTA CRUZ I.
S. CRISTOBAL I.
SANTA MARIA I.
ESPANOLA I.
Same Scale as Main Map
Longitude West from Greenwich

329. Peru.—Peru has a long shore line, but the country is not so long or narrow as Chile (Fig. 324). It may be divided into three sections: first, a seacoast section west of the Andes; second, a mountain belt, with plateaus and valleys of high altitude and temperate climate; and third, a section on the eastern slope of the Andes, and along the headwaters of the Amazon.

Peru is rich in minerals, especially petroleum, copper, silver, and gold. With good roads and modern methods of mining, Peru will yield more mineral wealth than was ever taken from the mines by the Incas.

An important vegetable product from the forests of Peru is quinine, the bitter medicine used in cases of fever. It is made from the bark of the cinchona, a tree that grows in Peru, Bolivia, Ecuador, and Colombia. It is also called Peruvian bark. So many trees were killed by stripping the bark, fear arose that the supplies would fail. Hence about sixty years ago trees were transplanted to British India, Java, and other parts of the East. The result is that the world's market is now mainly supplied from India.

Rubber is produced in the forests on the eastern side of the Andes. Although the Pacific ports are relatively near, the route over the Andes is difficult, and most of the Peruvian rubber is sent down the Amazon to Para.

Sugar and cotton, grown in the coastal regions, are, with coffee, wool, hides and skins, the chief agricultural productions. Peruvian cotton has a long woolly fiber, and is therefore in demand among cotton manufacturers for making special kinds of cloth.

Fig. 346. Observatory of Harvard University at Arequipa, Peru

Some rubber is produced, also cacao, tobacco, and corn. The sugar industry belongs mainly to the coastal region and ranks first in importance. Excellent rice is grown for home consumption. The leading exports are sugar, cotton, coffee, and petroleum.

Callao is the principal seaport of Peru, and a few miles inland is Lima, the capital. A railroad extends from Callao and Lima to Oroya in the high Andes. Paita is the port for northern Peru, and Mollendo for the southern part. From Mollendo, a railroad has been built across the mountains to Lake Titicaca, on the border of Bolivia. This lake, which has an area of about 4000 square miles, is the largest fresh-water lake in South America. It is nearly two and a half miles above sea level and is the highest navigable lake in the Western Hemisphere.

On the western slope of the Andes, at Arequipa (Fig. 346), Harvard University has an astronomical observatory. The air is very clear. Many stars can be seen there that cannot be observed from the Northern Hemisphere. Arequipa is a market for alpaca and vicuña wools, most of which are sent to New York and Boston in our own country, and to France.

330. Bolivia.—Bolivia was named after General Bolivar, the liberator of the northwestern parts of the continent. Like Paraguay, it has no seacoast. In the west it is a land of high plateaus among the Andes ranges, and in the north and east less elevated regions drain to the Amazon and Plata. In the highlands silver and gold are mined. Tin ore is now the chief product and, with the silver and gold, is largely exported. Rubber and coca are products of the eastern forests.

Fig. 347. Part of La Paz, Bolivia

Although at a distance from the sea (Fig. 345), Bolivia has several ways of reaching it. Three railroads now reach the coast, one of these leading to Mollendo in Peru, another to the port of Antofagasta in Chile, and the third from La Paz to Arica. Another railroad extends through Argentina to Buenos Aires. Steamboats go down the waters of the Amazon system from Bolivia to Para on the Atlantic. Ships also go from Bolivia by way of the Parana system to Buenos Aires. The total length of navigable rivers in Bolivia is 12,000 miles. The capital and chief city is La Paz (Fig. 347). Potosi is the center of the silver-mining district.

331. Ecuador.—Ecuador is so named because it is on the Equator. It is much like Peru in its surface and products, but differs from Peru in having a well-watered coastal lowland (Sec. 314). Both the eastern and the western mountain slopes are forest covered to a height of 5000 feet.

The principal port is Guayaquil. The capital, Quito (Fig. 348), is far up among the mountains. A railway from Guayaquil to Quito was finished in 1908. Ecuador has deposits of copper, iron, lead, and coal. Cacao, from which chocolate is made, ivory nuts, and coffee are the chief agricultural products. Many Panama hats are woven in Ecuador and in northern Peru. About Quito are Cotopaxi and other lofty volcanic peaks. Earthquakes are common, and many houses are built low, of timbers and bamboo laths, so that they may not be shaken down.

Review.—1. Describe the climate of northern Chile; of southern Chile. 2. What is the Central Valley? 3. What is the greatest mineral product of Chile? 4. Name and locate the capital; the chief seaport.

5. What three regions has Peru? 6. What are the chief ports of Peru? 7. Give an account of quinine. 8. Give two important facts about Arequipa.

9. What is the most important mineral product of Bolivia? 10. Describe the surface of Bolivia. 11. By what routes does Bolivia communicate with the outside world?

12. How does the coastal part of Ecuador differ from that of Peru? 13. Name and locate the capital and the chief port of Ecuador. 14. What is the leading product of Ecuador?

COUNTRIES OF THE NORTH COAST

332. Colombia.—Colombia borders the Pacific Ocean and the Caribbean Sea, and its chief port is Barranquilla, on the north shore, at the mouth of the Magdalena River. There are three ranges of the Andes in western

Fig. 348. Market place, Quito, Ecuador

Colombia, and the Magdalena and Cauca rivers flow northward in the intervening valleys. The eastern part of Colombia drains into the Orinoco and Amazon rivers, and belongs largely to the llanos, which continue eastward over much of Venezuela.

In the valleys and coastal lowlands many tropical products are raised, and on the higher grounds the fruits and grains of temperate regions flourish. The country abounds in minerals and rivals Russia in platinum.

Bogota is the largest city and the capital of Colombia. It is far in the interior and is more than 8000 feet above the level of the sea. It has street railroads and electric lights similar to those of a modern American city.

333. Venezuela. — Most of Venezuela is in the basin of the Orinoco River. There are low mountains in the south, and a range of the Andes in the northwest. Half the country is covered with forest. The products are similar to those of Colombia. The chief exports are coffee, cacao, and hides.

Caracas is the capital of Venezuela (Fig. 349), and although but a few miles from the Caribbean Sea, it is several thousand feet above the sea level. A narrow-gauge railroad leads down to La Guaira, the principal seaport. Maracaibo, on the lake or lagoon of the same name, also has large foreign commerce.

334. Guiana.—The Guianas belong to Great Britain, Holland, and France. They are undeveloped countries with a hot, moist climate and much forest. Sugar and molasses, made from sugar cane, are the chief exports. Gold is mined, especially in French Guiana. Georgetown, Paramaribo, and Cayenne are the three capitals.

ISLANDS

335. South American Islands.—The Falkland Islands are a wind-swept group 300 miles east of the Strait of Magellan. They are a crown colony of Great Britain. Some sheep are raised, but the chief use of the colony is as a coaling station for British ships.

Fig. 349. Capitol and National University, Caracas, Venezuela

Tierra del Fuego is an archipelago, whose whole area is about equal to that of the states of New Hampshire and Vermont. There are forests and grasslands, but the land has only a few thousand people. Part of it belongs to Argentina, and part to Chile.

Fringing the coast of southern Chile are many islands, and a few hundred miles to the west is Juan Fernandez, where an English sailor was cast away in the early days and had adventures which suggested the story of "Robinson Crusoe." The Colon Archipelago (Galapagos Islands) is on the Equator seven hundred miles west of Ecuador, to which country it belongs.

Review.—1. Describe the drainage of Colombia. 2. Name and locate the chief seaport. 3. What is the capital and how is it situated?

4. Name and locate the capital and two seaports of Venezuela. 5. What is the chief export?

6. Give the location and other facts concerning the Falkland Islands; Tierra del Fuego; the Colon Archipelago; Juan Fernandez. 7. Compare North and South America as regards islands.

8. Make from memory a map of South America, showing the countries, the chief mountains, the three chief river systems, and twelve or more important cities.

Fig. 350.

Map Study.—1. Which is the largest of the oceans? 2. Which has the most islands? 3. What oceans are joined by Bering Strait? 4. What lands border the Indian Ocean? 5. Locate Iceland with reference to the Arctic Circle; with reference to Norway and Greenland. 6. Compare the latitudes of Japan and New Zealand; of Madagascar and the Hawaiian Islands.

7. Through what waters in the Northern Hemisphere may one pass from the Atlantic to the Indian Ocean? 8. Compare the latitudes of the Gulf of Mexico and the Mediterranean Sea. 9. Compare the latitudes of the

ispheres

Cape of Good Hope, Cape Horn, and the island of Tasmania. 10. Compare the latitudes of Bering Sea, the British Isles, and southern Greenland.

11. Compare the longitudes of Cape Race and Cape St. Roque; of Panama and Hudson Bay; of Panama and Cape Mendocino.

12. What seas in the Eastern Hemisphere are crossed by the Tropic of Cancer? What gulf in the Western Hemisphere is crossed by the same line? 13. What island groups of the Pacific Ocean lie near the Tropic of Capricorn? What group is near the Tropic of Cancer?

Fig. 351. Nearly half of this hemisphere is land

Fig. 352. Most of this hemisphere is water

OCEANS, POLAR REGIONS, AND WORLD WINDS

THE OCEAN

336. Oceans and Seas.—Nearly three fourths of the surface of the globe is covered with salt water (Figs. 351, 352). This great body of water, which surrounds the lands, is called *the ocean*, or *the sea*, but five of its larger parts are called *oceans*, and many smaller bodies of salt water, which are connected with the ocean but are more or less landlocked, are called *seas*, *gulfs*, or *bays*. The Mediterranean Sea, Red Sea, and Caribbean Sea, the Persian Gulf, Gulf of Mexico, and Gulf of California, and Hudson Bay and Bay of Bengal are examples.

337. Ocean Basins.—Because the bottom of the ocean is lower than the lands, we often speak of the *ocean basins*. We must, however, remember that the deepest waters extend downward only a few miles, and that oceans are thousands of miles wide. If we could see the earth without any water on its surface, we should discover that the ocean basins are relatively slight depressions.

Around the continents, in most places, the water is shallow, that is, not more than a few hundred feet deep, for many miles from the coast. The shallow sea bottom bordering a continent is called a *continental shelf*. It is shown in the lightest blue tint, almost white, bounded by the 100-fathom (= 600-foot) line in Figures 326, 373, and other physical maps. If the continent and the shelf were to rise six hundred feet, this shelf would become land and be known as a coastal plain. At the outer edge of the shelf the sea bottom slopes down rather steeply until the water is several thousand feet deep, and a few places show depths of five or six miles. The deepest places of the sea measure about the same as the highest mountains, so that the total difference in elevation between the lowest ocean depth and the highest mountain top is nearly twelve miles.

338. **Sea Bottoms.**—The land surface and the sea bottom are very different in appearance. The land is made rough by the uplifting of mountains, and by the work of rivers, glaciers, and weathering. The ocean bottom, especially within a few hundred miles of the coast, is always receiving a cover of mud and sand that are brought from the land. The smallest of the mud particles are usually carried long distances from the continental border before they finally settle to the sea floor. Myriads of very small shelled animals, as well as fishes and larger sea creatures, live in the ocean; when they die, their remains dissolve and cover the deep sea bottom with fine oozy mud. As a result, the sea floor is mainly a plain, much wider and smoother than any prairie. There are places, however, where ashes and lava have accumulated around volcanic openings in the sea bottom, and some of these accumulations reach the surface, or even extend far above it as mountainous islands.

Many ships have been sent out for the study of the ocean waters, the living things in these waters, and the deposits on the bottom. Soundings of the deepest seas are made, and dredges or scoops bring up the mud and the animals of the sea floor. Many ships have also been sent to survey and map coasts and islands, and record the soundings for the benefit of navigators. The United States government publishes hundreds of maps of various parts of the ocean, especially along its own shores.

339. **Coast Islands.** — In the ocean are hundreds of thousands of islands. Some are mere islets of rock, some have a few square miles of soil, and some are large; for example, Madagascar, Cuba, and Newfoundland. Some of the islands along the coast of the continents are high and rocky and have been cut away from the mainland or formed by the sinking of a coast land of hills and valleys until the sea water filled the valleys and left the hills as islands. Other coast islands are low and sandy and have been formed in shallow water by waves and winds throwing up mud and sand.

340. **Volcanic Islands.** — In the open ocean many of the high islands, such as the Fiji and Hawaiian Islands (Fig. 353), have been made by volcanic eruptions. These began at the bottom of the ocean and have piled the materials higher and higher until in some cases they rise thousands of feet above sea level.

341. **Coral Islands.** — Other islands in the open sea, and in some instances not far from shore, are low and flat, and have been formed by the growth of animals called corals. The living animals have the appearance of flowers and stand fixed in their place. They live in shallow water, and have hard skeletons. The corals that are living, and the skeletons of those that are dead, make up a *coral reef* (Fig. 578). The living corals make the surface of the reef, and below is coral rock, formed mainly from the hard parts of the dead corals.

Fig. 353. A volcanic island, in the Hawaiian group

342. **Island Peoples.** — Many of the islands are inhabited, the people having come to them from neighboring continents or other islands. The natives of

some of the islands of the Pacific Ocean are descended from people who came from Asia or the East Indies. Their ancestors, at an unknown period of the past, made their way first from the mainland to the neighboring islands and then from island to island in such boats as they were able to make (Fig. 354).

Fig. 354. Boat made by natives of New Guinea

343. The Water of the Ocean.—The rocks in many regions contain salt. The water in the ground is constantly dissolving some of the salt, which is carried by the rivers to the ocean. When water is evaporated from the surface of the ocean, the salt and other dissolved substances are left behind, and ocean water is salt. On some seashores where the climate is dry and hot and the water shallow, salt is formed by the evaporation of the ocean water. Near the mouths of rivers ocean water is partly fresh, and is called *brackish*.

There is much limy material in sea water, due to the dissolving of limestone by ground water. Many other minerals are found in sea water, including even a little gold.

In the tropical regions the surface waters are warm, and they grow cooler toward the Poles. The sea about the North Pole is covered with floe ice formed by the freezing of ocean water. This is from six to twenty feet thick, and masses of it sometimes break away from the southern edge of the ice fields and float hundreds of miles southward in the Atlantic Ocean before melting. Such ice forms also about the Antarctic Continent. In addition, many icebergs, broken from glaciers, are found in the polar seas.

At great depths the water is cold, even near the Equator. This is because cold water is heavier than warm water, and so the cold water of the polar regions pushes slowly along the ocean floor underneath the warmer waters of the temperate and tropical seas. Self-registering thermometers have been let down to great depths, and have shown that the temperatures near the bottom are often but a few degrees above the freezing point.

344. Life in the Ocean.—The ocean is so great, covering three fourths of the earth's surface, that it holds a vast amount of life.

Many food fishes and the common shelled animals, such as oysters and clams, live in shallow water or in the mud near the shore. Some animals, like the corals, thrive only in a beating surf. Barnacles and seaweeds cling to rocks, where they are in the water at high tide and in the air at low tide.

Other forms are found far out from land, swimming at or near the surface of the sea. Still other creatures live in the depths of the ocean, where it is dark and cold, where there is no wave action, no change from day to night, and no change of seasons.

WAVES, CURRENTS, AND TIDES

345. Waves.—Most waves are caused by winds, which stir the surface of the water. Even violent winds do not move the water more than a few hundred feet below the surface. A wave is a moving ridge of water. The top of the wave is called the crest. The depression between two waves is the trough. In a small pond waves may be a few inches high. On a lake a mile or two wide they may be high enough to engulf a small boat. On the ocean, in violent storms,

waves may be thirty or forty feet high, and may make it necessary for large ships to keep their course across the waves in order to pass through the storm safely. Persons on deck, and even parts of the rigging of ships, are often carried away by storm waves.

It is not the water itself, but the wave shape of the water that moves so fast along the surface. Drop a chip on the surface of a pond that is rippled by a strong breeze. The chip will move back and forth and go slowly over the pond, while the wave moves swiftly.

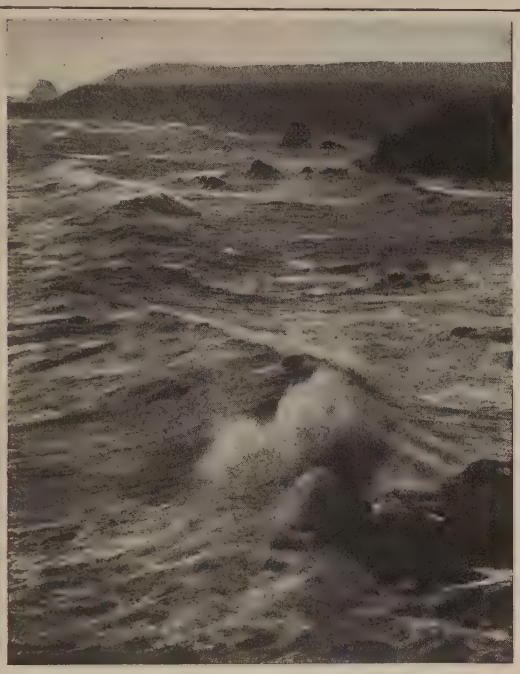

Fig. 355. Surf

346. Surf.—We often see waves close to shore when farther out the water is still or has a gentle swell. A thousand miles out to sea there may be a heavy storm and big waves. Some of the wave motion passes through the more quiet waters outside the storm. Near the shore the water is shallow, and the quiet movement, or swell, makes a wave roll up, turn over, and break at the crest. Therefore we speak of *breakers* or *rollers*. This narrow belt of waves near the shore we call the *surf* (Fig. 355). Where the beach is low and slanting, the water of the breaking waves runs up the beach and back again continually. The water that runs back along the bottom in a strong current under the waves is called the *undertow*.

347. Work of Waves.—The surf waves cast up sand and pebbles and make a gently sloping *beach*. On the borders and around the head of a bay, beaches are usually smooth and beautifully curved. The surf acts like a mill upon the pebbles and sand grains of the bottom. It stirs them, rubs them against one another, and thus grinds them to powder. Storm waves cast these materials up and build ridges at some distance inland from the usual shore line.

Where the waves beat against a steep coast, they wear away the rocks and form a cliff, which may be hundreds of feet high, because in time they may cut far back into the side of the hill or mountain (Fig. 372). Where the waves beat harder at some places than at others, or where the rocks at one point are soft or full of joints, the waves may dig caverns for some distance into the face of the cliff.

Where the sea is shallow for a long way from the shore, a reef or beach may be built at some distance from the land. The waves gather up mud and pebbles which they drop when they break. The new land thus formed is called a *barrier beach*, and the narrow body of shallow water that separates it from the mainland is called a *lagoon*. On some shores, such as that of New Jersey, the barrier beaches extend many miles.

Sailors do not fear great waves on the open sea, where they have sea room, but they are in danger when the ship is so near the shore that it may be driven aground or dashed against the rocks by heavy surf. Great storm waves may rush in upon a city that stands on a low shore and cause much damage,—as at Galveston in 1900, before the city built its sea wall. Earthquakes sometimes start waves which destroy coast towns and even carry ships several miles inland.

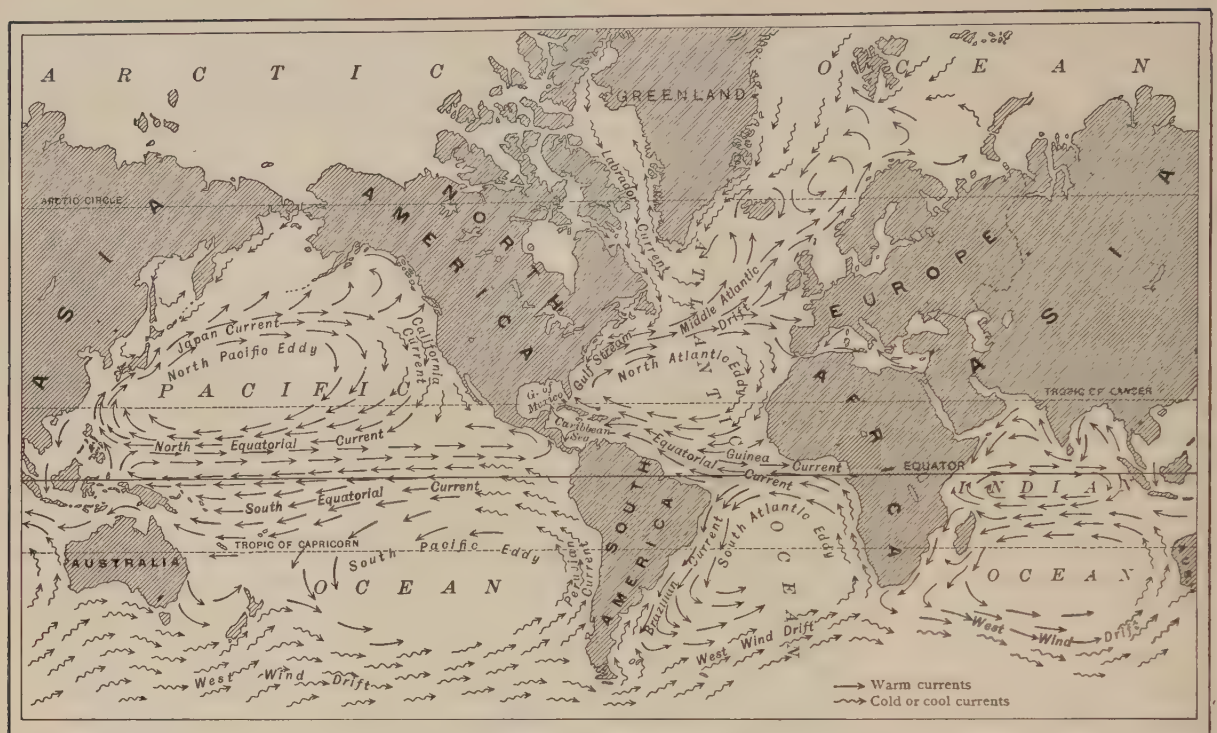

Fig. 356. Ocean currents

348. North Atlantic Ocean Currents. — Along the Equator in the Atlantic Ocean the waters move slowly westward, from west Africa to South America. Along the coast of Brazil they divide, and the northern parts flow among the West Indies and through the Caribbean Sea and the Gulf of Mexico. From the Gulf of Mexico a strong current flows at the rate of four or five miles an hour through the Florida Strait, and bears northeast past the east coast of the United States. This part of the moving water is known as the *Gulf Stream*. It is about 75 miles wide and it is warmer than the water on either side because it comes from the tropics. As the Gulf Stream moves out toward the middle Atlantic it loses its velocity, broadens out, and becomes a slow *drift*. These drifting waters reach western Europe, and some of them go toward Norway, while some go southward past the Iberian Peninsula and join the west-moving equatorial current. Thus we have a complete circuit known as the north Atlantic eddy (Fig. 356), whose waters move from left to right, like the hands of a watch.

There is also an Arctic current whose cold waters come past Greenland, Labrador, and Newfoundland, as far south as New England. Icebergs from the Greenland coast float to the region of Newfoundland or farther south before they melt, and fogs are common in that part of the Atlantic where the warm, moist air of the Gulf Stream belt mingles with the colder air over the Arctic current.

These ocean currents help to make the difference in temperature between the eastern coast of America and the western coast of Europe in the same latitudes (Fig. 590).

349. South Atlantic Currents. — The waters that turn southward along the Brazilian coast swing back to the east and flow northward along the coast of Africa, making a south Atlantic eddy (Fig. 356). In this eddy the waters move from right to left, or counter to the hands of a watch. We thus have two great eddies in the Atlantic Ocean.

350. Pacific Currents.—The Pacific Ocean has two eddies like those of the Atlantic. The western part of the north Pacific eddy is the Japan current. It moves eastward past Alaska, and southward along the western coast of North America. On the west coast of South America the waters move from the Antarctic regions northward and are known as the Peruvian or Humboldt current.

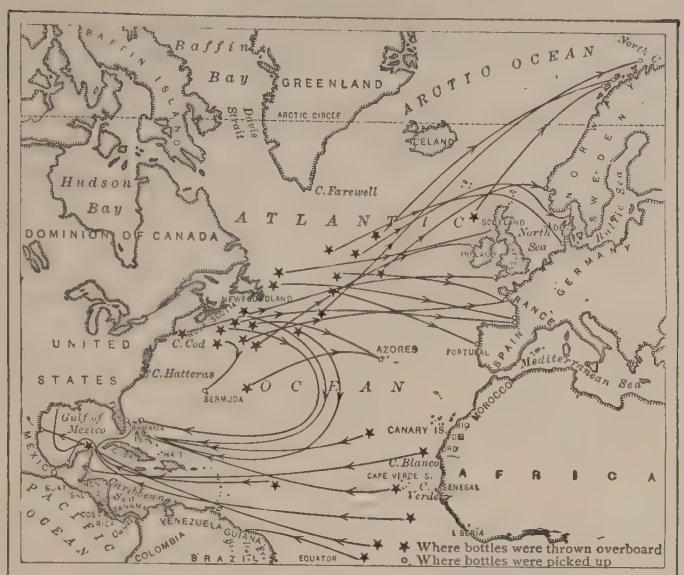

Fig. 357. Currents indicated by drifting bottles

351. The Study of Ocean Currents.—We cannot see the motion of an ocean current, and we learn most about such currents by studying the movements of floating objects. Sealed bottles are thrown out, containing a record of the latitude and longitude at which they are cast into the sea. Some bottles dropped in the western Atlantic have been found on the shores of Norway and Ireland, and others have gone around to the West Indies. Abandoned ships, or derelicts, have been sighted at different times, and it is found that they also drift with the ocean currents.

352. Tides.—On the shores of the ocean, even when no winds are blowing, the water slowly rises and falls. Such movements are called *tides*, and they are due to the low, wide waves known as tidal waves. The two extremes are called high tide and low tide. When the water is falling, we speak of the *ebbing* of the tide. The interval between two successive high tides is 12 hours and 26 minutes.

On a flat shore the ebbing of the tide leaves a broad beach uncovered, and people who wish to bathe may have to go out several rods to reach the water. If the shores are steep, the bottoms of the cliffs may be laid bare. These are frequently covered with barnacles and dark, dripping seaweed, while small pools among the rocks are full of shelled creatures.

Boats are often left high and dry and cannot go out until the tide comes in again. (Figs. 358, 359). Many harbors and the

Fig. 358. Low tide, Digby, Nova Scotia

Fig. 359. High tide at the same point, six hours later

Fig. 360

THE WORLD

PRINCIPAL TRANSPORTATION LINES AND COMMERCIAL DEVELOPMENT

channels that lead to them can float large ships only at high tide. For example, large ships must often wait in the Lower Bay at New York for high tide before they can come up to the docks, and must time their sailing by the state of the tides. Tide tables are published so that sailors can always know at what hours they will find deep water in any of the world's great harbors.

Where the shores of a bay or river mouth narrow, the waters of the rising tide are pushed together and roll in rapidly, making a noticeable *tidal current*. A current is also formed when the water of the bay or river mouth falls rapidly at the time of the ebb tide. In thus sweeping in and out, the tides are useful in cleansing the harbors, carrying away sewage and other filth, which if allowed to remain would pollute the waters, causing bad odors and disease.

In some bays, as the Bay of Fundy on the Atlantic coast of Canada, and the Bristol Channel on the west coast of Great Britain, the shores converge for a long distance and the tides rise and fall fifty feet or more. Where the tidal range is so great, wide flats of mud may be exposed at ebb tide. Landing stages or floating piers are sometimes built in harbors. These rise and fall with the tide and are joined to the shore by inclined bridges.

Some rivers are entered by a swift-running tidal wave. It is like a heavy surf, or moving wall of water, and is called a *bore*. Examples are found in the lower Amazon and in the Seine in France.

Tides are very small in seas with narrow entrances, like the Mediterranean, and in the Great Lakes.

353. **Cause of Tides.**—The times of rising and falling tide correspond to positions of the moon, the nearest of the heavenly bodies (Sec. 574). The rising of the water, or the tidal wave, is due to the pull or attraction of the moon. As the earth turns on its axis the wave goes around the world. If the surface were all water, a low, unseen wave, a few feet high and thousands of miles wide, would go around the globe. But because the lands interrupt, the tidal wave pushes up on the shores. Sometimes the moon and the sun are in line with the earth and pull together, and then the tides are a little higher than usual. It is not correct to use the words tidal wave for a large wave due to an earthquake or a storm.

USES OF THE OCEAN

354. **Influence on Temperature and Rainfall.**—It is not a waste for the earth to have so much water instead of forests and fertile fields. We should remember that the oceans receive and hold the heat of the sun, and the currents move far north and south of the Equator. The winters in the temperate and polar regions are much warmer than they would be if the oceans did not stretch so far north and south. It is the ocean also that furnishes the water for rains and snows. Without the ocean, the earth would be a desert, a part of it hot and the rest of it cold, and animals and plants could not live.

355. **Food Supply.**—The ocean also furnishes food. For thousands of years the peoples dwelling by the sea have depended much on fish, and by the help of railroads and canning factories every one, however far inland, can now have sea food.

356. **Highway.**—The ocean is the greatest of highways. A nation that lives by the sea is neighbor to all other nations that live on the ocean border. There are no expenses for keeping the ocean highways in order. When docks and ships are built, men and goods can be carried around the world. Figure 360 shows the most important steamship routes.

357. **History of Navigation.**—In ancient times men learned to row or sail their small boats near the shores. At first they went

NORTH POLAR REGION
Scale of Statute Miles
0 50 100 200 300 400
510 MILES TO ONE INCH
Explorers' Routes shown thus:
ELEVATIONS IN FEET.
OVER 5000
2000 TO 5000
1000 TO 2000
SEA LEVEL TO 1000
Depths in Fathoms.
Sea level to 100
100 to 1000
1000 to 2000
over 2000
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North Pole
Peary, April 6 & 7, 1909
Nansen 1895
Cagni 1900
over 1500
UNEXPLORED REGION
ARCTIC OCEAN
Nansen
Limit of Ice Pack
Arctic Circle
Extreme Limit of Icebergs
Greenland Sea
Norwegian Sea
Barents Sea
Kara Sea
Kara Strait
Nordenskjöld Sea
Beaufort Sea
Baffin Bay
Davis Strait
Hudson Bay
Hudson Str.
Denmark Strait
The Middle Ice
The Interior is entirely covered with Ice
8500-9800 HIGHEST ALTITUDE
Petermann Peak 9482
Inglefield Gulf
Independence Bay
Mary Musgrave Bay
Ice Fiord
Bass Rock
Jan Mayen Island
Bear Island
Franz Josef Land
Nicholas II Land
C. Chelyuskin
Taymyr Pen.
Lena Delta
New Siberia Is.
Bennett I.
Jeannette I.
Henrietta I.
Wrangell I.
Herald I.
Kola Pen.
White Sea
Gulf of Finland
Gulf of Bothnia
North Cape
Vardo
Hammerfest
Tromso
Tronhjem
Bergen
Leningrad
Shetland Is.
Orkney Is.
Faroe Is.
Scotland
Iceland
Hekla
Reykjavik
Angmagsalik
Tasiusak
Upernivik
Godthaab
Sydproven
C. Farewell
Disko I.
Cape York
Cape Columbia
Lincoln Sea
Grant Land
Ellef Ringnes I.
Axel Heiberg I.
Prince Patrick
Melville I.
Banks Island
Victoria Island
Wollaston Land
Victoria Land
Prince of Wales
King William I.
Cockburn Land
Baffin Land
Southampton I.
Fort Ross
Fort Rae
Great Slave L.
Fort Simpson
Fort Chipewyan
Fort McPherson
Dawson
Fairbanks
Mt. McKinley 20,300
Nome
Point Barrow
C. Prince of Wales
C. Deshnef
Behring Strait
Gulf of Anadir
Kotzebue Sound
Yukon R.
Mackenzie R.
Peace R.
Athabasca R.
Liard R.
Nelson R.
Churchill R.
Saskatchewan R.
Winnipeg R.
Red R.
Assiniboine R.
Missouri R.
Columbia R.
Fraser R.
Thelon R.
Back R.
Coppermine R.
Kazan R.
Ungava Bay
Hudson Str.
Ice Fiord
Greenland
Alaska
Siberia
Russia
Finland
Sweden
Norway
Iceland
Scotland
Atlantic Ocean
Pacific Ocean
Arctic Ocean
Fig. 361
NORTH POLAR REGION

from point to point along the shores, or made their way from island to island. Gradually they built larger boats and ventured across large bays and out into the open ocean. It was thus that all the lands about the Mediterranean Sea were explored, and the gulfs and headlands of western and northern Europe became known. In modern times Columbus and others crossed the Atlantic, and the expedition of which Magellan was the leader went around the world.

Fig. 362. Taking observations at sea

Until about a hundred years ago ships were moved by sails, and it often took several weeks to cross the Atlantic. Now steamships are in use which travel at the rate of 20 to 25 miles an hour, and go from New York to Liverpool or Rotterdam in from five to seven days. Such are the large and fine ships built for passenger service. The larger of these are 700 to 900 feet in length and can carry several thousand passengers.

Slower ships carry freight and passengers across the Atlantic in about ten days, and the passage from San Francisco, Seattle, or Vancouver, to Japan, China, or the Philippine Islands, takes about three weeks. Besides the steamship *lines*, whose vessels make regular trips joining the great seaports and countries of the world, there are a vast number of merchant ships known as *tramps*, which go wherever they can find a cargo.

By means of the compass, by observations on the sun, and in other ways the captain of a modern vessel can tell just where his ship is (Fig. 362). If the ship is not far from shore, lighthouses may serve as guides. By wireless telegraph mariners not only communicate with each other but may call radio stations on the shore, which observe directions and quickly compute a ship's exact position. This method is specially important during fogs.

THE POLAR REGIONS

358. Arctic Ocean.—The Arctic Ocean covers the region of the North Pole and stretches southward to the shores of North America, Europe, and Asia. It is joined to the Pacific Ocean by Bering Strait, 36 miles wide, and to the Atlantic Ocean by the wide sea in which Iceland lies. East of Iceland the warmer waters drift to the north of Europe and keep that part of the sea freer of ice than the regions north of our own continent. West of Iceland and west of Greenland, the Arctic waters flow southward and form the cold Labrador current.

359. Arctic Travel.—Many daring voyages and sledge journeys across frozen lands and ice floes have been made during the past hundred years in order to learn about these northern regions. Many men and ships have been lost, but others have dared to keep up the search. Explorers have been compelled at times to travel and camp in temperatures ranging from 50° to 70° below zero. They travel on land or ice, carrying their camping outfit and food on sledges drawn by dogs, and they sleep in bags made of skins. They usually have the help of the native Eskimos, from whom they also obtain the dogs.

The floe ice or ice pack crumples into rough ridges, or breaks into fields with lanes or "leads" of open water between, so that sledging over it is very dangerous.

The map (Fig. 361) shows that much of the Arctic region is still unexplored.

360. Recent Arctic Explorers.—In 1895 Nansen, a Norwegian explorer, took his ship, the *Fram*, far into the ice pack north of Asia, and then went by sledge to latitude 86° 14′. In 1900 part of the expedition under the Duke of Abruzzi, an Italian explorer, went to 86° 33′. On April 6, 1909, Peary, an

Fig. 363

SOUTH POLAR REGION

Scale of Statute Miles

0 500 1000

1030 MILES TO ONE INCH

Explorers' Routes to South Pole shown thus:---------

Elevations in feet.

- OVER 5000
- 2000 TO 5000
- 1000 TO 2000
- SEA LEVEL TO 1000

Depths in fathoms.

- Sea level to 100
- 100 to 1000
- 1000 to 2000
- over 2000

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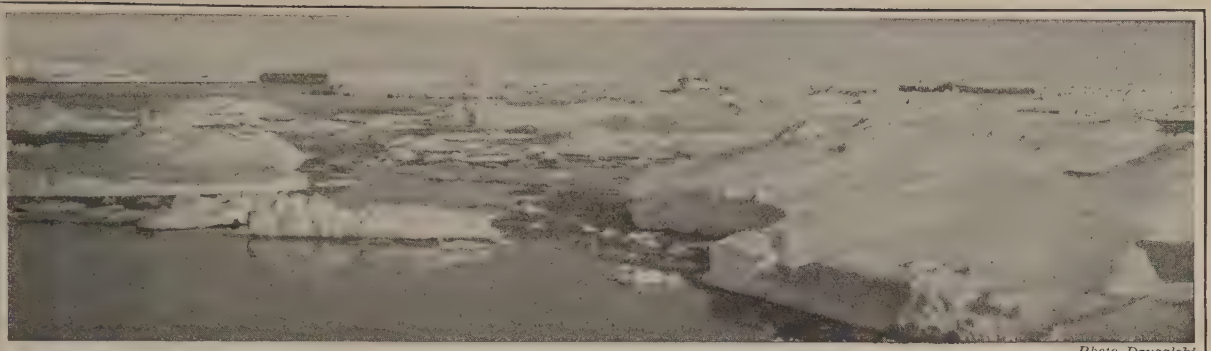

Photo Drygalski

Fig. 364. Antarctic sea border, showing vast tabular icebergs and the edge of the ice-covered continent

officer of the United States navy, reached the North Pole and raised the American flag there. He had explored northern Greenland and the polar ice for many years, and at last gained the goal for which so many explorers had long striven.

361. Antarctic Regions.—The Antarctic region is very different from the far north. There are no land masses to separate the Antarctic Ocean from the Atlantic, Pacific, and Indian oceans, but the name is given to the waters that stretch around the world near the Antarctic Circle. In these waters there are many icebergs from the great glaciers on Antarctic lands, for the south polar region is a continent instead of a sea. It is not known how far it is a true continent, nor to what extent the lands consist of large islands, but it is thought that the continent may be as large as Europe or larger. Explorers have sailed hundreds of miles along the edge of a single ice sheet where it pushes into the sea. In some places there are high mountains and active volcanoes. Mt. Erebus is an active volcano, and is more than 13,000 feet in altitude.

362. Recent Antarctic Explorations.—In 1909 a British exploring party under Sir Ernest Shackleton reached a point 111 miles from the South Pole. The Pole itself was finally reached by a Norwegian explorer named Roald Amundsen, on December 16, 1911. A few weeks later it was also reached by another party under the leadership of Captain Scott of the British navy. On the return trip Scott and several of his men died of starvation. Records of their last days have been recovered, and the story which they tell is one of fearful hardship and wonderful bravery.

The elevation at the South Pole is about 10,000 feet above sea level. At the North Pole there is an ice-covered sea, and at the South Pole an ice-covered land.

Review.—1. How does the ocean bottom differ from the surface of the lands? 2. What is a continental shelf? 3. What is the origin of many of the high islands of the ocean? 4. What is a coral reef? 5. Why is ocean water salty? 6. How do the surface and bottom waters near the Equator differ in temperature?

7. Why are breakers often seen near the shore when the waters farther out are smooth? 8. What are the results of wave action on high coast lands? 9. What is a barrier beach?

10. Describe the currents in the north Atlantic Ocean; in the south Atlantic Ocean. 11. How is the direction of ocean currents determined? 12. Where is the Peruvian current?

13. What is the ebbing of the tide? 14. Name localities where the tides are high. 15. What causes tides?

16. Give some of the uses of the ocean. 17. What length of time do modern ships require for crossing the Atlantic Ocean?

18. Give the name of the explorer who reached the North Pole, and the year in which he discovered it. 19. Name the discoverer of the South Pole. 20. How does the north polar region differ from the south polar region?

Fig. 365
WINDS AND TEMPERATURES IN JANUARY

Fig. 366
WINDS AND TEMPERATURES IN JULY

WORLD WINDS

363. Westerly Winds of the North Temperate Region.—In studying sections 363–367 consult Figures 33, 365, 366, and 367. We have already learned some facts about the westerly winds in our study of North America and the United States. From the North Pacific Ocean they reach southern Alaska, Canada, and the United States. With them comes moisture which falls as rain and snow along the coast and on the windward side of the western mountains. But after crossing the mountains the winds descend to the lower lands farther east as drying winds, with the result that the plains and plateaus just east of the high mountain ranges are arid.

Along with these winds, on their way east, whirling storms, or cyclones, are produced, and we have a succession of warm weather with rain or snow, followed by cool and clear weather. The winds move on across the north Atlantic and bring to western Europe warm air and much rain, as in the case of the Pacific Ocean and western North America.

The westerly winds pass on across Germany and Russia, but they carry less heat and moisture to these countries, and still less to Asia. Eastern Europe and western and central Asia, therefore, have a continental climate, like that of the upper Mississippi basin, marked by extremes of heat and cold.

The prevailing westerly winds of the north temperate region do not blow exactly from the west, but usually from a direction south of west. An American making a voyage to Europe is much less likely to meet "head winds" than when returning. The pupils should make and study a record showing the direction of the wind twice a day for several weeks.

364. Westerly Winds of the South Temperate Region.—As the westerlies of the Northern Hemisphere do not blow directly from the west but usually from directions south of west, so those of the Southern Hemisphere commonly blow from directions north of west. These winds of the south temperate region are much more steady than those in the northern latitudes, because they are much less disturbed by the influence of lands and high mountains. South America is the only continent that reaches far enough south to be across their path, and the southern part of this continent is narrow. The greater part of the zone of the westerlies is south of Africa and Australia, and hence they blow freely around the world. They are also much less interrupted by whirling storms or cyclones than the westerlies of the north temperate belt.

The strength and steadiness of these westerly winds is of importance to the masters of sailing vessels, who call the region the "roaring forties" and the winds the "brave west winds." They dread to beat their way around Cape Horn to the west, because the winds are against them, the air is raw, and the sea is rough. A sailing vessel from the north Atlantic countries, bound for Australia or the south Pacific islands, will go eastward past the Cape of Good Hope and follow the westerlies to its destination. Then it will continue east with the favorable wind, pass Cape Horn, and return through the Atlantic Ocean to the place from which it started.

The effect of the prevailing westerly winds in giving rain to southern Chile and in making southern Argentina dry is described in section 314.

365. Northeast Trade Winds.—The northeast trade winds blow from the northeast across the West Indies, Mexico, Central America, and the northern part of South America (Sec. 314). Blowing from the ocean, they bring a heavy rainfall to the eastern highlands and slopes of these regions.

They continue across the Pacific Ocean and bring ample rains to the northeastern

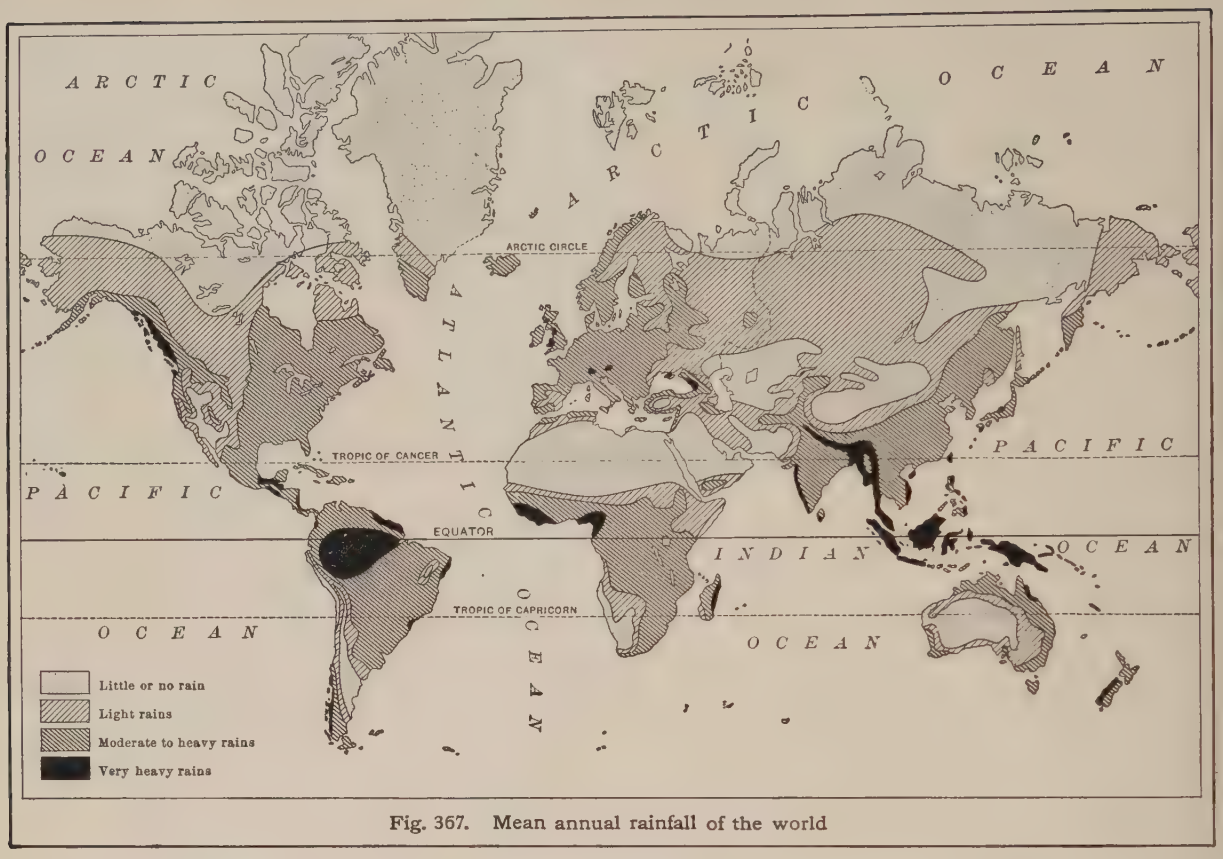

Fig. 367. Mean annual rainfall of the world

slopes of the Hawaiian Islands. Likewise they bring rains to the Philippine Islands and to parts of southeastern Asia. India is in the trade-wind belt, but has special winds called *monsoons* which will be explained in section 373.

The northeast trades also cross southwestern Asia and north Africa. Here they blow for such long distances over the land that they do not receive much moisture. Since they blow from northeast to southwest, they are always passing from a cooler into a warmer region. As air grows warmer, more moisture can be evaporated into it; hence winds that are warmed are ready to receive moisture instead of giving it up as rain. The northeast trades passing over Arabia, Egypt, and the Sahara region are warmed, and are drying winds, and therefore these lands are deserts.

Sailors take advantage of the trades as they do of the westerlies. It was easy for Columbus, in spite of his fear of unknown seas, to sail from a Spanish port to the West Indies because he was in the course of the northeast trade winds. It was also easy for other Spanish or Portuguese navigators to sail to the northern and eastern shores of South America.

366. Southeast Trade Winds.—South of the Equator the trade winds of the Southern Hemisphere blow from the southeast (Fig. 33). Crossing the south Atlantic, they blow across the widest part of South America. As the moist air is pushed to greater altitudes in crossing the higher lands, these winds bring a heavy rainfall to the eastern slopes of the Brazilian Highlands, and to the east slopes of the Andes. West of the Andes, however, in the "rain shadow" of the mountains, are the desert parts of Chile and Peru (Secs. 314, 328, 329).

Crossing the Pacific Ocean, the southeast trades reach eastern Australia. The principal mountains of this continent are in the east (Fig. 566), and as the air rises in crossing them it is cooled, and there is abundant rain on the eastern slopes. West of the mountains the rainfall is much less, so that the central and western parts of Australia are mainly desert.

In like manner these winds affect a large part of southern Africa. The well-watered regions are in the east, while the dry regions are on the western or Atlantic side of the continent.

367. The Belt of Equatorial Calms.—Between the two trade-wind belts is a region of *equatorial calms*, or *doldrums*, in which there are no prevailing winds. This belt is dreaded by the masters and crews of sailing vessels because they often have to wait many days before there is wind enough to take them across it. It is also a region of frequent and heavy rains. The mornings are usually clear, but as the hot part of the day comes on the air is heated, expands, and in the upper atmosphere spreads out toward the polar regions. At the surface the cooler, heavier air of the trade winds pushes in from both sides and crowds under the heated air. As the heated and lighter air, containing much water vapor, is pushed upward, it is cooled, and the moisture condenses and falls as rain. This is similar to what happens in a thunderstorm in midsummer in the temperate latitudes.

A ship going from St. Johns, in Newfoundland, to Punta Arenas, in southern South America, would cross first the belt of the westerly winds of the Northern Hemisphere; second, the region of northeast trades; third, the belt of equatorial calms; fourth, the region of the southeast trades; and fifth, the belt of westerlies of the Southern Hemisphere (Fig. 33).

368. Shifting of the Wind and Calm Belts.—In our summer in the Northern Hemisphere the sun at midday is high, and as far north as the Tropic of Cancer is directly overhead at some time during the summer. In our winter the sun at midday is low; the vertical rays are south of the Equator, and near midwinter reach as far south as the Tropic of Capricorn. Thus the direct rays of the sun shift back and forth across the Equator, and the belt of greatest heat, which is the belt of equatorial calms or doldrums, moves northward and southward. The great wind belts to the north and south of it shift in the same way, through several degrees of latitude, with each year's change of seasons (Figs. 365, 366).

369. Wet and Dry Seasons.—Since rain is plentiful in the doldrum belt, we can understand why many warm countries have a dry and a wet season each year. When the belt of calms, in shifting its position to the north or south, is over one of these warm countries, that country has rains. When the belt of calms has passed to the north or south, the country is crossed by the trade winds and becomes comparatively dry. Near the Equator are some regions that are completely crossed by the shifting wet belt twice a year, and twice entirely left behind by it. Such regions have two wet and two dry periods each year.

370. World Winds and the Ocean Currents.—The waters of the equatorial currents (Secs. 348–350) move westward and thus have a direction much like that of the trade winds. The waters in the temperate belt of the north Atlantic move eastward, as do the prevailing westerly winds. In like manner the waters of the south Atlantic eddy move eastward in the track of the westerlies of the Southern Hemisphere. In the Pacific Ocean the east and west winds and currents correspond in the same way.

If there were no continents to block the way, these currents of water would flow around the earth. But they strike the lands and are turned from their course. For ex-

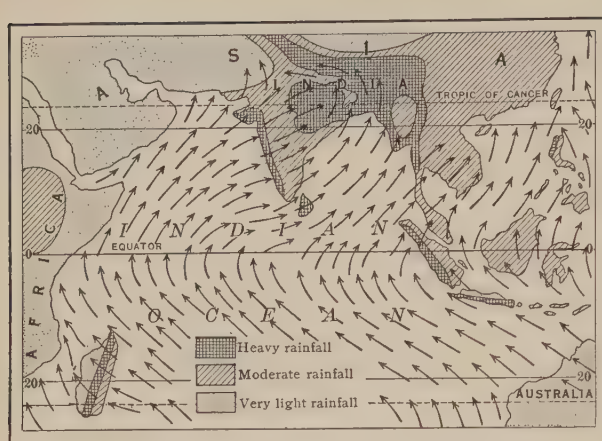

Fig. 368. Winds and rainfall of southern Asia in July

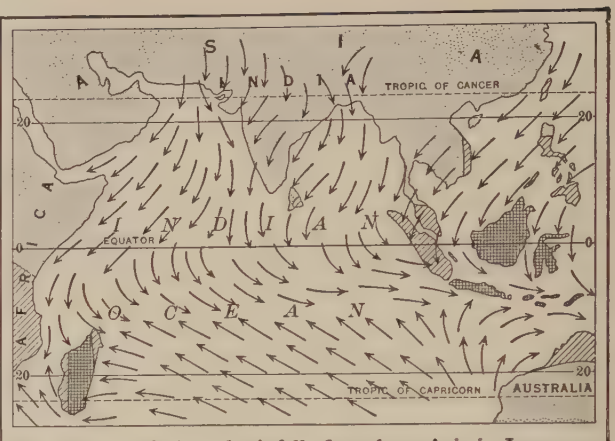

Fig. 369. Winds and rainfall of southern Asia in January

ample, the equatorial current of the Atlantic divides, in the western part of the ocean, and some water goes north and some south until it is caught in the east-moving current. The east-moving currents in their turn strike the coasts of Europe and Africa, and thus complete the two great eddies of the Atlantic Ocean. In this way the world winds and the continents combine to direct these slow but great movements of the ocean waters.

CAUSES OF WINDS

371. Movements in Small Bodies of Air.—When a door is opened between a warm room and a cold room, the heavier air of the cold room pushes in beneath the lighter air of the warm room, and there is what we call a draft. This is really a small wind. When a bonfire is built, the air above it, with the particles of smoke and the gases of the flame, is heated, expands, and is pushed upward. The air rises not because it has no weight, but because the cooler air is heavier and pushes in below the heated air. This movement is a light wind. The same thing occurs when a fire is built in a stove, or when a lamp is lighted in a room.

372. Shore Winds.—On the shores of a lake or ocean, breezes are formed in a similar way. In the daytime, under a hot sun, the land absorbs heat rapidly and becomes warmer than the water, and the air over the land is heated and becomes lighter. This light, warm air is lifted up by cooler and heavier air that moves in from the water as a lake or sea breeze. At night the land cools more than the water, and the heavier air from the land spreads out under the warmer and lighter air that is over the water; this movement is a land breeze.

373. Monsoons.—In the summer the land of India and other parts of southern Asia is very much heated. The air expands and flows outward in the upper atmosphere so that the air that remains presses less heavily on the surface, and the cooler, heavier air from the Indian Ocean pushes in and creates strong winds blowing from the ocean over the land. A great amount of moisture moves inland with them and falls as rain, making a part of India the wettest region in the world. Along the lower Ganges, several hundred inches of water fall each year, and in the region of heaviest rainfall it amounts to 50 or 60 feet a year.

In the winter the land is cooler than the ocean, and the winds are then reversed, blowing southward and giving the country its dry season.

These seasonal winds, blowing from one direction in summer and from the opposite direction in winter, are called *monsoon winds*, or simply *monsoons*.

374. World Winds.—Since the earth's surface is warmer in the equatorial regions than it is in the temperate and polar regions, the air is expanded and its upper parts flow off to the north and south towards the poles. At the same time the cooler air at the surface of the earth on the north and south of the equatorial calm belt moves in and forces the warm air to higher levels. This is the cause of the trade winds.

These winds, however, do not blow directly toward the Equator from north and south, as we should expect, but they blow obliquely toward the Equator from the northeast and southeast. This turning of the trade winds to the westward is due to the rotation of the earth on its axis.

If the air should continue to move toward the Equator without any return currents, all the air would soon be piled up in one belt around the globe. But the air that moves upward in the belt of calms turns to the north and south and flows back over the trade winds. These upper currents are the *anti-trade winds* (Fig. 370). They are known to be real winds because they are felt on some high mountains that reach above the level of the trade winds. Sometimes also high clouds drifting along with these winds may be seen moving in a direction opposite to that of the trades.

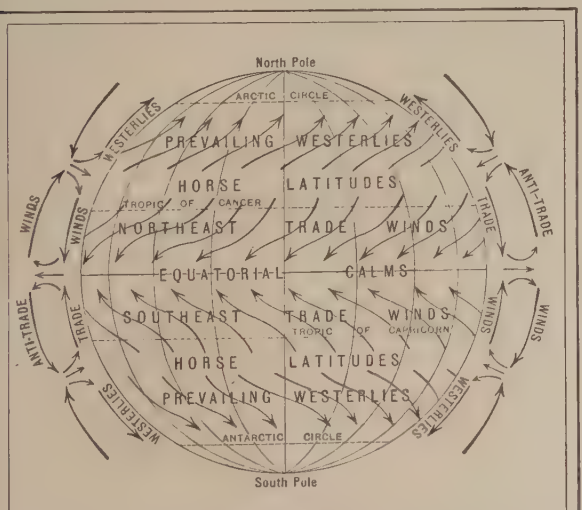

Fig. 370. Winds on the earth's surface; also vertical section of the atmosphere, on a larger scale, showing circulation

When the air of the anti-trades reaches the north and south limits of the trades, it descends to the earth in calm belts, known as the *horse latitudes* (Figs. 33 and 370). These lie between 30° and 35° north latitude and between 30° and 35° south latitude. Some of the descending air supplies the trade winds and goes back toward the Equator; some of it moves to the northeast in the Northern Hemisphere and to the southeast in the Southern Hemisphere, and forms, in both Temperate Zones, the prevailing westerly winds. While the trade winds turn toward the west, the winds of the Temperate Zones turn aside toward the east on account of the rotation of the earth.

Thus the great winds keep up a circulation of the atmosphere between low and high latitudes and between the lands and the oceans. In this way both heat and moisture are widely distributed over the surface of the earth, and countries are made useful to man that otherwise could provide little to meet his needs.

Review.—1. What regions of much rain are in the track of the westerly winds of the Northern Hemisphere? 2. Indicate the track of the westerly winds and their cyclonic storms in this hemisphere (Sec. 363 and Fig. 33). 3. What name is given by sailors to the westerlies of the Southern Hemisphere? 4. Why are these winds more steady than those of the Northern Hemisphere? 5. How do these winds affect the course of sailing vessels?

6. What great desert is in the track of the northeast trade winds? 7. What other dry regions occur in this belt? 8. Name the wet and dry regions in the track of the southeast trades.

9. Where is the belt of calms? Why is its rainfall large? 10. Why does the belt of calms shift in its position? 11. What is the effect upon the seasons in certain regions?

12. What are the causes of the great eddies in the oceans?

13. Give examples to explain the origin of winds. 14. Give an account of the anti-trade winds. 15. What are some of the advantages that come to man by means of the world winds?

ARCTIC OCEAN
ATLANTIC OCEAN
Arctic Circle
ICELAND
Reykjavik
Mt. Hekla
FAROE IS. (To Den.)
SHETLAND IS.
ORKNEY IS.
HEBRIDES IS.
NORWAY
Hammerfest
North Cape
Vardo
LOFOTEN IS.
Trondhjem
Bergen
Stavanger
Oslo (Christiania)
Lapland
Murmansk
Kola Peninsula
Kolguef I.
Karin Peninsula
Nova Zembla
Kara Strait
Vaigach I.
Tornea
Uleaborg
White Sea
Archangel
Dvina R.
Pechora R.
Ural Mountains
NATURAL BOUNDARY
SIBERIA
Ekaterinburg
Perm
Ob R.
Irtish R.
Gulf of Bothnia
Lake Onega
Lake Ladoga
Tammerfors
Abo
Helsingfors
Gulf of Finland
Leningrad (Petrograd)
Gefle
Stockholm
Reval
ESTHONIA
Peipus L.
Valdai Hills
Rybinsk
Yaroslaf
Kazan
Ufa
Volga R.
Kama R.
Nizhni Novgorod
Samara or Orenburg
Tver
Moscow
Vitebsk
Tula
Oka R.
Uralsk
Saratof
Orel
Kursk
Don R.
Kief
Kharkof
Tsaritsyn
Ekaterinoslaf
Rostof
Astrakhan
Caspian Sea
Sea of Azof
Krasnodar
Sebastopol
CRIMEA
Kherson
Odessa
Jassy
Kishenef
Caucasus Mts.
Mt. Elburz
Tiflis
Baku
Batum
GEORGIA
ARMENIA
AZERBAIJAN
Mt. Ararat
Aras R.
Black Sea
Constantinople
TURKEY
Angora
Smyrna
Aegean Sea
Athens
Gulf of Corinth
Salonica
Sea of Marmora
Dardanelles
Bosporus
CRETE
CYPRUS
Mediterranean Sea
Sofia
Philippopolis
Balkan Mts.
BULGARIA
Belgrade
Danube R.
Transylvanian Alps
RUMANIA
Bucharest
Cetinje
Tirana
ALBANIA
Dinaric Alps
Adriatic Sea
YUGOSLAVIA
Trieste
Fiume
Milan
Venice
Bologna
Genoa
Turin
Florence
Leghorn
Rome
Naples
Mt. Vesuvius
Brindisi
Tyrrhenian Sea
Strait of Messina
Palermo
SICILY
Mt. Etna
Messina
Catania
MALTA
SARDINIA
CORSICA
Marseille
Barcelona
Balearic Is.
Cartagena
Gibraltar
Malaga
Sierra Nevada
Cadiz
Seville
Valencia
Murcia
Madrid
Lisbon
Oporto
Tangier
Fez
Algiers
Tunis
AFRICA
PORTUGAL
SPAIN
Cantabrian Mts.
Pyrenees Mts.
Bilbao
Saragossa
Toulouse
Bordeaux
Bay of Biscay
C. Finisterre
C. St. Vincent
Strait of Gibraltar
FRANCE
Lyon
St. Etienne
Limoges
Nantes
Orleans
Tours
Brest
Cherbourg
Mayre
Paris
Strasburg
Nancy
Metz
Bern
Geneva
Lake Geneva
Mt. Blanc
Alps Mts.
Zurich
Stuttgart
Munich
Vienna
AUSTRIA
HUNGARY
Budapest
Szeged
Prague
CZECHOSLOVAKIA
Carpathian Mts.
Lemberg
Krakow
Warsaw
POLAND
Lodz
Danzig
Konigsberg
Vilna
Minsk
Kovno
LITHUANIA
Riga
LATVIA
Gulf of Riga
Libau
Memel
Stettin
Berlin
Dresden
Breslau
Leipzig
Hamburg
Bremen
Magdeburg
Frankfort
Cologne
Dusseldorf
Essen
Amsterdam
Rotterdam
Antwerp
Brussels
Ostend
Calais
Dover
Boulogne
Rouen
Havre
English Channel
Southampton
London
Birmingham
Liverpool
Manchester
Sheffield
Leeds
Hull
ENGLAND
Irish Sea
St. George's Channel
Queenstown
Dublin
Belfast
IRELAND
Londonderry
Glasgow
Edinburgh
SCOTLAND
GREAT BRITAIN
BRITISH ISLES
North Sea
Skagerrack
Kattegat
DENMARK
Copenhagen
Malmo
Gotaland
Gotsborg
Norrkoping
Oesel
Gulf of Bothnia
Kiolen Mts.
SWEDEN
Scandinavian Mts.
Lofoten Mts.
Arctic Ocean
Sea of Japan
Lake Baikal
Irtish R.
Ob R.
Yenisei R.
Lena R.
Kara Sea
Novaya Zemlya
Vaigach I.
Kolguef I.
Barents Sea
White Sea
Karin Peninsula
Kola Peninsula
Murmansk
Lapland
Tornea
Uleaborg
Archangel
Dvina R.
Onega R.

Facing 260

EUROPE IN 1914, BEFORE THE WORLD WAR. For comparison with Fig. 371

TERRITORIAL CHANGES IN EUROPE, RESULTING FROM THE WORLD WAR

NEW COUNTRIES

Poland, about 150,000 square miles, population about 27,500,000.

Danzig, about 600 square miles, population 365,000.

Lithuania, about 25,000 square miles, population about 2,300,000.

Latvia, 24,000 square miles, population about 1,500,000.

Esthonia, about 18,500 square miles, population 1,110,000.

Sarre Basin, about 750 square miles, population about 650,000.

Czechoslovakia, 54,700 square miles, population about 13,500,000.

Fiume, 10 square miles, population about 50,000. In 1924 Fiume was transferred to Italy.

Finland, 130,000 square miles, population about 3,400,000.

GAINS OF EXISTING COUNTRIES

France gained Alsace-Lorraine, about 5600 square miles with population about 1,800,000.

Belgium gained about 385 square miles with population about 150,000.

Denmark gained about 1530 square miles with population about 230,000.

Italy gained about 12,500 square miles with population about 1,900,000.

Serbia expanded into *Yugoslavia* by union with Montenegro and the southern provinces of Austria-Hungary, and slight gains from Bulgaria and perhaps Albania. Before the war Serbia and Montenegro together had an area of about 39,500 square miles and a population of about 5,000,000. Yugoslavia or Greater Serbia has about 95,000 square miles and about 12,000,000 population.

Rumania gained more than 60,000 square miles with population over 8,000,000. Both area and population were more than doubled.

Greece gained about 13,000 square miles with population about 1,400,000, in Europe, besides territory in Asia Minor; but as a result of war with Turkey in 1922 lost nearly all her gains except small areas south of Bulgaria.

LOSSES OF EXISTING COUNTRIES

Germany lost about 30,000 square miles with population about 6,000,000. It still has a much larger population than any other European country except Russia.

Austria lost about 84,000 square miles with population about 22,000,000. Austria now has about 30,700 square miles, population about 6,000,000.

Hungary lost about 89,000 square miles with population over 12,000,000. Hungary now has about 36,000 square miles, population about 7,800,000.

Bulgaria lost about 3000 square miles with population about 300,000.

Turkey lost most of the territory remaining to her in Europe, but in 1922 regained nearly all of it, so that her territory in Europe is now almost what it was in 1914.

Russia suffered severe losses. Before the war her area in Europe was about 2,000,000 square miles, population about 140,000,000. The losses aggregate about 300,000 square miles and (from cessions, war, and famine) 45,000,000 population, leaving about 1,700,000 square miles and 95,000,000 population for the present Russia in Europe.

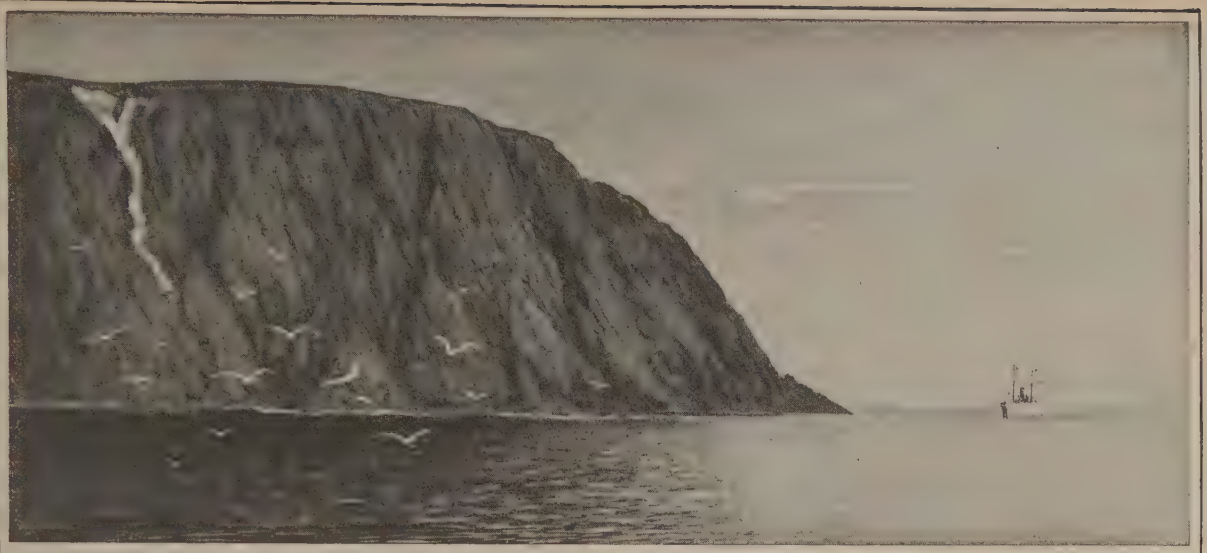

Fig. 372. North Cape, as seen from the east

EUROPE

Map Study.—1. What is the latitude of North Cape? Of Gibraltar, at the southwest of Europe? 2. Find three important European cities that are near the parallel of 40° north latitude. 3. What states of our own country are crossed by this parallel?

4. What countries of Europe border the Black Sea? The Mediterranean Sea? 5. Locate the Baltic Sea; the North Sea; the Bay of Biscay; the White Sea. 6. Name the great peninsulas of Europe (Fig. 373). 7. Make a sketch map of the coast line of Europe, naming the principal seas and bays, and the important islands.

8. Describe the course of the Rhine, the Danube, the Rhone, and the Po. 9. Describe the course of three of the chief rivers of Russia.

10. What countries border upon Germany? 11. What countries have no seacoast?

12. On what waters would a ship travel in going from Odessa to Leningrad (Petrograd)?

PHYSICAL FEATURES

375. Position.—Europe has many bays, seas, peninsulas, and islands along its coast. In proportion to its size it has a much longer coast line than any other continent. On the east, it has for the most part a land boundary, and we may think of Europe as a great peninsula of the larger continent, for Asia is more than four times as large as Europe. Asia and Europe are sometimes considered to be parts of one continent, called Eurasia; but they have had such different histories that they are generally called two continents.

Europe joins Asia and is near Africa, and the journey between Europe and North America can now be made in about five days. No other continent is so near to all these other continents as Europe. Its central position among the continents has given its people great advantages in trading with other nations.

A very large part of its total area is in the temperate belt. The most northern point is North Cape (Fig. 372), a little more than 71° north of the Equator. Small parts of four countries, Norway, Sweden, Finland, and Russia, are north of the Arctic Circle. The most southern point is in Spain at about 36° north latitude. This corresponds in latitude with North Carolina, Tennessee, and northern Arizona. Although Europe has no land in the Torrid Zone, it is warmer, as a whole, than North America or Asia.

Fig. 373
Physical
EUROPE
Scale of Statute Miles
0 100 200 300 400 500
430 MILES TO ONE INCH

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376. Mountains.—Europe has two mountain regions, with a lowland between them. This is also the general arrangement of highland and lowland in North America and in South America (Sec. 311). A chain of mountains runs the whole length of the Scandinavian Peninsula, where the highest peak is 8400 feet above the sea. There are also mountains in Scotland, in the north and west of England, in Wales, in Ireland, and in western France. All these uplands are old and much worn, and together make up the mountain lands of northwestern Europe.

Fig. 374. A glacier in the Alps

The greatest mountains of Europe, however, are in the south. The chief ranges are the following: the Pyrenees, on the borders of France and Spain; the Alps, in France, Switzerland, Italy, Germany, and Austria (Fig. 374); and the Carpathians, in Czechoslovakia, Poland, and Rumania. South of these are other ranges, such as the Sierra Nevada in Spain, the Apennines in Italy, and many rugged uplands in the Balkan Peninsula.

Most of the mountains of southern Europe are much younger and higher than those of northwestern Europe. Since they were uplifted there has not been enough time for weathering, streams, glaciers, and the falling and sliding of rocks and earth to wear them down, as the mountains of Great Britain or Scandinavia have been worn.

The low ranges of the Ural Mountains form a part of the boundary between Europe and Asia.

377. Central Plain.—The central plain of Europe is narrow in the west and broad in the east. It includes parts of southern England, the northern part of France and Belgium, the Netherlands, Denmark, northern Germany, and nearly all of Russia. Around the British Islands the water is shallow, and the bottom is a part of the continental shelf (Sec. 337). If the continent and the shelf were to rise a few hundred feet, all this shelf, including the bottom of the North Sea and of the Baltic Sea, would become a part of the central plain.

South of the Ural Mountains and north of the Caspian Sea the plain of Europe joins with the Asiatic plain that extends through Siberia. There is therefore a continuous lowland reaching from the Atlantic Ocean across Europe and Asia to Bering Strait. In eastern Europe it stretches from the Black Sea to the Arctic Ocean, and all of northern Asia belongs to it.

378. Drainage Slopes.—Europe has four drainage slopes (Fig. 377): (1) The Mediterranean slope includes all the lands that incline toward the Mediterranean and Black seas. (2) The Atlantic slope includes all lands whose rivers flow into the Atlantic Ocean, or into the adjoining North and Baltic seas. (3) The Arctic slope drains into the ocean of that name. (4) In the southeast is a part of the inland drainage basin of the Caspian Sea. This slope and most of the Arctic slope are in Russia.

379. Glacial Invasion.—Like North America, Europe had a glacial period. The ice sheet covered all of Scandinavia and most of Great Britain. As the land then stood at a higher level than now, the ice covered the region of the North and Baltic seas, and swept over much of Germany and Russia (Fig. 375). Most of the Alpine country in Switzerland, France, Italy, Austria, and Germany was also covered with glaciers formed by heavy snows falling in the mountains. The soils were moved, the rocks worn, bowlders scattered, and lakes formed, just as in those parts of North America over which the ice passed.

380. Existing Glaciers.—Small glaciers are still found in the Alps, in the Pyrenees, and in the Scandinavian Peninsula. Nearly all of them are in mountain valleys or on high mountain slopes, as in western America. Some, especially in Switzerland, have long been studied by men of science, and are visited by thousands of tourists every year.

381. Mediterranean Coast Line.—The entire coast line of Europe is very irregular. Seas penetrate far into the land, with the result that the climate of western and southern Europe is oceanic rather than continental in character (Sec. 363). The seas also furnish highways for ocean ships, reaching the largest cities and the regions of densest population. The greatest of these seas is the Mediterranean, which borders Europe on the south, Africa on the north, and extends eastward to Palestine and Asia Minor. For much of the year it is swept by winds that blow across the lands of southern Asia and Europe into northern Africa. These are drying winds, and therefore there is much evaporation from the surface of the Mediterranean. As a result the Mediterranean waters are even more salt than those of the ocean.

Three arms of the Mediterranean extend northward. These are: (1) The Aegean Sea, between Asia Minor and the Balkan Peninsula; into the Aegean the Black Sea discharges through the Bosporus, the Sea of Marmora, and the Dardanelles. (2) The Adriatic Sea, between the Balkan and Italian peninsulas; on its northern shores are the ports of Venice, Trieste, and Fiume. (3) The wide body of water between Italy and Spain; at its northern end is the Gulf of Genoa, and farther west is the great seaport Marseille, near the mouth of the Rhone River.

Fig. 375. Europe in the glacial period

Southern Europe has three great peninsulas: the Balkan, the Italian, and the Iberian. The Iberian Peninsula includes Spain and Portugal; it lies between the Mediterranean on the east and the Atlantic on the west. It is separated from Africa by the Strait of Gibraltar, which is only eight miles wide in its narrowest part.

There are also many islands in the Mediterranean and its tributary seas.

Fig. 376. Iron Gate. In the background are forest-covered mountains

British Isles. They have a very uneven coast line, with deep bays, bold headlands, and many great seaports. Most of the rivers of the British Isles, and of the North and Baltic Sea regions, have deep tidal mouths, or *estuaries*. Hence seaports like Hamburg, Antwerp, and London may be a long distance inland, and sea trade is made easy. In the north, Scotland and Norway are mountainous, and the mountains are cut by steep-sided valleys, in which deep fiords extend from a few miles to as much as a hundred miles within the highlands. Thus there are many quiet and safe waters for fishing and for the ships of commerce.

382. Atlantic Coast Line.—The coast line in the west and north is as irregular as in the south. The Bay of Biscay is open to the Atlantic and has important seaports in northern Spain and western France. The English Channel connects the Atlantic Ocean and the North Sea and has a number of English and French ports on its shores. The North Sea has on its borders seven of the countries of Europe. It receives the Thames, the Rhine, and the Elbe, all rivers of great commercial importance. Through it sail the ships bound to or from the ports of London, Antwerp, Rotterdam, Bremen, Hamburg, and many other cities. The Baltic Sea is almost inclosed by lands. It receives many rivers, and since it is in a cool region, evaporation from its surface is small. Its brackish waters are only about one fourth as salt as those of the ocean. The least important of the great indentations is the White Sea, opening from the Arctic Ocean, but it has considerable commerce from northern Russia, through the port of Archangel.

The peninsulas of western Europe are Brittany, Denmark, and Scandinavia. The most important islands of the world are the

383. Rivers.—Four large rivers have their principal sources in the Alps. The largest of these is the Danube, which rises north of the Alps, but is joined by many rivers which flow northward from these mountains. It crosses or borders seven countries on its way to the Black Sea. The river passes between the Transylvanian Alps and the Balkan Mountains by a wonderful gorge called the Iron Gate (Fig. 376).

The Rhine, which rises in the Alps, flows northward across western Germany and the Netherlands, and has built a large delta on the edge of the North Sea. The river has been deepened and improved and now furnishes the highway for an enormous river trade. There are many large cities on its banks.

The Rhone rises under the Rhone Glacier in Switzerland, flows a long distance between ranges of the Alps, passes through the Lake of Geneva, and enters France. It then flows southward to the Mediterranean.

Many large streams flow southward from the glaciers and snow fields of the Alps, into Italy. Most of them join the Po, which pours its waters into the Adriatic Sea.

The central parts of the Russian lowland are somewhat higher than the surrounding lands (Fig. 373), and from this region long rivers flow out in several directions. The Volga, the largest of these, is more than 2000 miles long and flows to the Caspian Sea. The Black Sea receives the Don and the Dnieper. The Pechora and Dvina flow northward into the Arctic Ocean, and the Duna flows westward into the Gulf of Riga, which is a part of the Baltic Sea (Fig. 377). Nearly all the rivers of this group are important highways of trade.

Many important rivers enter the Atlantic Ocean between the Gulf of Riga and Gibraltar. The Vistula flows for most of its course through Poland on its way to the Baltic. The Oder, the Elbe, and the Rhine all have the larger part of their courses in Germany. Find on the map (Fig. 371) the great seaports which have grown up near the mouths of these streams. Three of the Atlantic rivers — the Seine, the Loire, and the Garonne — have their whole courses in France; and four smaller rivers are in Spain and Portugal.

The Thames, the Mersey, the Tyne, and the Humber are rivers of England, the mouths and lower courses of which have been improved to furnish harbors for ocean-going ships.

384. **Fresh-water Navigation.**—None of the European rivers equal in size the principal rivers of the Western Hemisphere. Even the Volga and Danube are small in comparison with the Amazon or the Mississippi. Many of the small European rivers, however, bear thousands of ships and barges laden with freight, for they flow through countries of dense population, and where it has been necessary they have been fitted for navigation by dredging the mud or blasting out rocks to make the channels deeper. Their navigation has also been made easier by the building of dams and locks to form a series of deep-water levels along their courses.

Many of the European rivers have been connected by canals. Canal boats can go by river and canal from Bordeaux on the Bay of Biscay to the Mediterranean Sea; or from Havre, Antwerp, or Rotterdam to the mouth of the Rhone. A boat can go from the North Sea up the Rhine, cross a small section of southern Germany by canal, and go down the Danube to the Black Sea. In eastern Europe boats can be sent from Archangel or Leningrad to Astrakhan on the Caspian Sea; or from Riga on the Baltic to Odessa on the Black Sea (Fig. 371).

Fig. 377. Drainage basins of Europe

385. **Climate of Central and Northern Europe.**—For a continent that is so far north

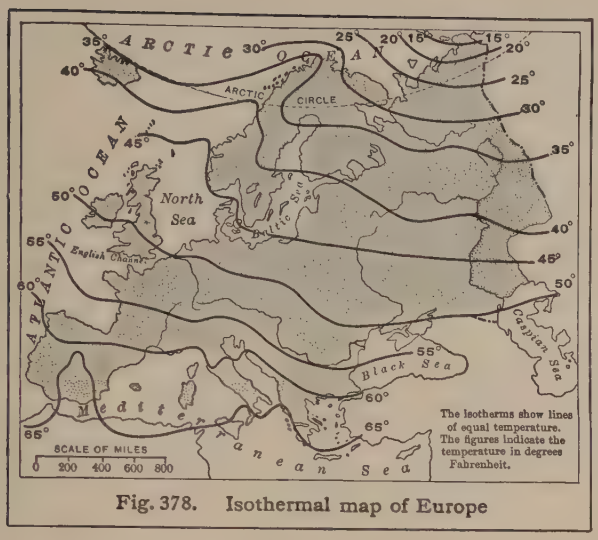

Fig. 378. Isothermal map of Europe

(Sec. 375), Europe has a warm climate. Its western coasts are washed by the mild Atlantic waters, which drift northward and keep the northern shores of Europe comparatively free from ice (Sec. 348). The westerly winds bring the temperatures of the ocean far inland into central Europe (Fig. 378). They can do this, because there are no high mountains in western Europe, as there are in western North America, to break their course.

Although ample rains fall on the west coast of Europe, sufficient moisture is left in the air to furnish rain for crops in central Europe (Fig. 379). If Europe had a continuous range of high mountains in the west, corresponding to those in the continent of North America, there would be a desert on their leeward (eastern) side. As we go east in Europe the winters are colder and the summers are warmer. In Russia the climate is continental, with moderate rainfall and extremes of temperature as the seasons change. Some of the far northern plains of Russia are treeless, moss-covered tundras.

386. Climate of the Mediterranean Slope. —The Mediterranean Sea tempers the extremes of both winter and summer; with its tributary seas it reaches in among the lands and makes them warmer in winter and cooler in summer than they would otherwise be.

The high mountain barriers everywhere on the north shut out the cold north winds. As a result the Mediterranean shore of France called the Riviera is sought by thousands who wish to escape the severe northern winters. The same is true of the Italian Riviera east and west of Genoa, where palms and oranges grow in the latitude of southern Maine, Toronto, and the Yellowstone National Park. Compare the climate and the agricultural products of this Mediterranean region with those of the northern part of the United States, which is in the same latitude.

Owing to the shifting of the wind belts, the Mediterranean region in winter is in the track of the westerly winds, and plentiful rains fall. In summer, however, when the belt of calms and the wind belts move northward, the Mediterranean region is in the

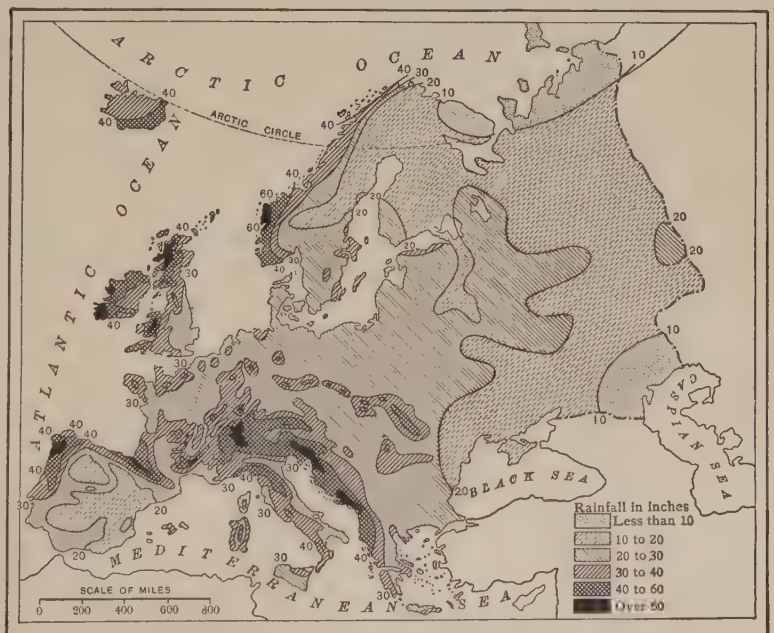

Fig. 379. Average annual rainfall in Europe

track of the northeast trades. As we have already learned (Sec. 365), these winds in Europe and Africa are drying winds, because they blow mainly over the lands and because they pass from cooler to warmer lands. Therefore the summers are dry, and in many parts of Greece, Italy, and Spain irrigation is needed in raising crops, even though many of the lands are near the Mediterranean waters.

Fig. 380. Lands occupied by the different peoples of Europe

Review.—1. Why is the position of Europe favorable to commerce? 2. To what parts of the United States do the most southern parts of Europe correspond in latitude?

3. Give a brief description of the surface of Europe. 4. To what other continents is there a resemblance? 5. What ranges belong to the mountain belt of southern Europe?

6. Where on the coast are there large regions of shallow water? 7. What is the bottom of these regions of shallow water called?

8. What countries are partly or wholly included in the Atlantic slope of Europe?

9. What was the extent of the principal ice sheet of Europe? 10. Where are glaciers still found?

11. Describe the coast line of southern Europe, naming the main seas and peninsulas. 12. Describe the seas, gulfs, and peninsulas that lie between Great Britain and Russia. 13. What is a fiord? What countries of Europe have many fiords?

14. Name and describe the rivers which have their main sources in the Alps. 15. Describe the courses of the Volga, the Dnieper, the Dvina. 16. What important rivers have their courses mainly in Germany? 17. Name three rivers in France. 18. Describe three courses along which it is possible to cross Europe by water.

19. Why has a region so far north as Europe so mild a climate? 20. Why is the rainfall of western Europe greater than that of central Europe? 21. Why have some parts of southern Europe dry summers?

HISTORY AND PEOPLE

387. Ancient History.—In very ancient times there were civilized nations in western Asia and Egypt. The Phœnician people lived at the eastern end of the Mediterranean Sea, and they sailed their trading ships everywhere in the Mediterranean region. The Grecian peninsula and islands are not far from Asia, and upon them grew up the first civilized city-states of Europe. The Greeks planted colonies in southern Italy, Sicily, and southern France.

Later the Roman people established a great empire. At first controlling only a small territory about the city of Rome, they grad-

ually extended their sway over all Italy, and then over all the countries that border the Mediterranean, in Europe, Asia, and Africa. They sent armies across the Alps and conquered much of Germany, and all of France, a region which was then known as Gaul. They conquered the Iberian Peninsula, and went across the English Channel and built roads, forts, and cities in Great Britain. They not only conquered the native tribes, but also taught them the ways of civilized people. In Gaul and the British Isles many of the natives were *Celts*, whose descendants make up a large part of the population of France, Scotland, Wales, and Ireland.

For several hundred years the Roman Empire ruled nearly all the lands that were then civilized. At length, however, the German and other tribes of the north grew strong and invaded and conquered Italy and other parts of the empire. The great Roman dominion was broken, and the countries of modern Europe slowly developed.

388. Latin Nations.—There are now more than twenty-five nations in Europe. With few exceptions each has a language of its own. The Italians, the French, the Spanish, and the Portuguese are called the *Latin* nations because they are descended partly from the Roman people, who spoke the Latin tongue. Their languages have all grown out of the Latin, and resemble one another as do members of the same family. The Rumanians likewise claim descent from the Romans, and are proud to bear their name.

389. Teutonic Nations.—The nations of central and northwestern Europe are related to one another in a similar way, and are sometimes called *Teutonic*. The Dutch and the German people still hold the lands where their early ancestors lived. Tribes known as Angles and Saxons went from the mainland to Great Britain, and from one tribe we have the name England, or Angleland, and from both names combined we have the term Anglo-Saxon. The Danes, Swedes, and Norwegians also are Teutonic people. Some of their ancestors were known as Northmen and Vikings. They were daring sailors, pirates, and warriors. Many of them settled in Great Britain and northern France, in Iceland, and Greenland.

390. Slavic and Other Peoples.—Many of the people of eastern Europe, including Russia, Poland, Czechoslovakia, Yugoslavia, and Bulgaria, are called Slavs, or Slavonic people, from a leading tribe that once lived in that region. All of the peoples thus far named, including the Greeks, the Celts, the Latins, the Teutons, and the Slavs, belong to the white race. The Hungarians, the Finns, and a few other Europeans are of Mongolian origin; that is, they belong to the yellow race, and their ancestors came from Asia not many centuries ago.

391. Population.—Although a small continent, Europe has about 450,000,000 people, —more than any other continent except Asia (Fig. 381). They are descended from strong and active races, and have been successful in all lines of industry. As the climate is favorable and there is much fertile and well watered soil, a large part of the food needed by the enormous population is raised in their own fields. Many food fish, also,

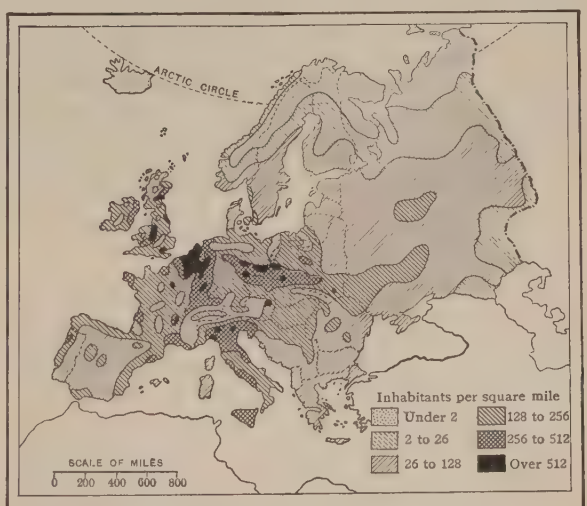

Fig. 381. Distribution of population in Europe

are caught in the adjacent waters. In recent years, however, the growth of population has been favored by the development of manufacturing. This has led to the importation not only of food but also of a variety of raw materials. The bays and land-locked seas have favored the growth of commerce, and a large part of the world's commercial fleet is manned by European sailors.

Fig. 382. St. Peter's and the Vatican, Rome

392. Religions.—In the Latin nations the prevailing religion is the Roman Catholic form of the Christian faith. There are also many Roman Catholics in Germany, Austria, Hungary, Czechoslovakia, Poland, Great Britain, and other countries of Europe. The home of the Pope and the seat of the papal government is the Vatican Palace in Rome. The majority of the Teutonic people are Protestants, while the Greeks, Russians, and some other peoples of eastern Europe hold to the ancient Orthodox form of Christian belief and worship. There are also in Europe many Hebrews and some Mohammedans.

Fig. 383. Lincoln Cathedral, England

393. The World War.—The war which began in August, 1914, involved all but six of the nations of Europe. Less than one seventh of the area of Europe and less than one eleventh of the population of the continent remained neutral. The war not only caused vast loss of life and property, but led to important territorial changes. Germany and Russia lost various parts of their domains, Austria-Hungary was dismembered, and several new nations were established (Fig. 371). To prevent future wars if possible, a League of Nations was formed, including most of the countries of the world.

394. Government.—Before the World War there were but three important republics in Europe. Switzerland has long had this form of government. France became a republic in 1871, and Portugal in 1910. All the other leading countries were *monarchies*. In some of these the rights of the people were fully protected by constitutions and lawmaking bodies like our Congress.

As a result of the war, Germany, Austria-Hungary, and Russia ceased to be monarchies. Most of the newly established nations of Europe adopted a republican form of government. Less than half the countries of the continent still remain constitutional monarchies as they were before the war.

395. Postal Union.—The countries of Europe, except Russia, have joined with the United States and other progressive nations in an International Postal Union. This union has an office in Bern, Switzerland, and a convention is held at intervals of a few years to arrange for quick and efficient mail service.

Fig. 384. Road cut into a mountain side, Switzerland

396. Money.—Most of the countries have their own special forms of money. The unit in British money is the pound, which is equal, usually, to $4.86 of our money. Gold coins of this value are called sovereigns and are accepted in almost all countries in payment of debts. In France and Switzerland the unit is the franc, usually worth nearly twenty cents, and in Italy it is the lira, which has the same value. The Germans use the mark, which normally is equivalent to twenty-four cents. The banks in all the principal cities will exchange foreign for home money, and travelers carry letters of credit, or negotiable checks, on which they can draw funds. Conveniences of this sort are very necessary in countries that wish to develop and encourage trade with foreign people.

397. Roads.—The common roads of Europe are better built than those of any other continent, and most of them are kept in constant repair. The building of good roads began in the time of the Romans, and some of the Roman roads are still in use. In the hundreds of years that have passed since the time of Roman rule, good roads have been built in all parts of the continent except in Russia and southeastern Europe. Good roads make travel much easier, and a team of horses can draw a much larger load over them than they can over the unimproved roads in many parts of our country. The roads are used also by an enormous number of automobiles and motor trucks.

398. Railroads and Steamship Lines.—Europeans are advanced in railroad building. They build the roadbeds so firm and run the trains with such care that there are fewer accidents than in America. In the United States, however, there is a greater mileage of railroads than in Europe, and some of the passenger trains are provided with more conveniences and luxuries than can be found on any European trains. The freight cars in America are much larger, and because of the great size of our country freight is usually hauled longer distances.

The greater part of the world's ocean shipping is controlled by European steamship companies, the largest of which belong to Great Britain.

OCCUPATIONS AND INDUSTRIES

399. Agriculture.—Several of the countries of Europe are densely populated. Some countries, as England and Belgium, have five or six hundred people on the average for each square mile. Much food is needed, and most of the good land, and much that is poor, is carefully cultivated.

More wheat is raised in Europe than in any other continent. All the Latin nations raise large crops, but it is all needed at home. Russia, however, and some of the other southeastern countries, raise more than they use, and have some for export. Rye and barley flourish in cool climates and are grown extensively in Germany, Russia, and some other northern countries. Much corn is

Fig. 385. Regions producing sugar beets

raised in Hungary, Rumania, and Italy, where the people use it chiefly for their own food rather than for fattening stock as in our country.

Germany raises more potatoes than any other country. Poland and Russia rank high, and even France, in some years, raises more than the United States. Potatoes form one of the chief food crops in Ireland. Sugar beets are grown throughout central Europe (Fig. 385). Germany leads in this industry and in normal times exports large quantities of beet sugar. Russia, Ireland, France, and Belgium all raise flax. The fiber of this plant is used to make linen, and the seed is used for the manufacture of linseed oil. The United States, Argentina, India, and Canada are the other leading countries in the production of flax.

400. **Fruit Raising.**—In western Germany there are many vineyards. In France there are vineyards in most parts of the country; and the grape-growing industry is important almost everywhere in Italy, Spain, and Portugal, and in many parts of southeastern Europe. Some of the grapes are eaten as fresh fruit, but most of them are used in the manufacture of wine, or are cured as raisins.

Subtropical fruits grow in the countries along the Mediterranean Sea. The most important of these are oranges, lemons, olives, figs, and a kind of currant that is really a small raisin. These currants form the leading export of Greece.

Mulberry trees are grown in Italy and France, because the leaves furnish the necessary food for silkworms. Small fruits and garden vegetables are raised in all parts of Europe to supply the people of hundreds of cities and thousands of smaller towns.

401. **Fishing.**—Among other means of supplying food, fishing is important. The waters of the continental shelf and of the numerous shallow seas are full of fish. The North Sea especially is a field for fishermen, and most of the countries around it have for centuries sent out fishing fleets. Thousands of their men are engaged in gathering food from the waters (Fig. 386). They have fished both in European waters and along the Atlantic coast of North America. Some European rivers also are regularly stocked with fish.

402. **Grazing.**—Another source of food is in the herds of cattle and sheep. In nearly all of Europe except the northern forests and tundras sheep are raised in great numbers, both for wool and for mutton; but the supply does not meet the demand, and much wool and mutton have to be imported from Australia and Argentina. All the European

Fig. 386. Norwegian fisherman arranging a net for salmon where the tides are high

countries raise cattle, and yet both beef and leather must be brought from North and South America, Australia, and New Zealand. Milch cows are kept, and butter and cheese are made, in nearly all the countries of Europe. Butter is an important product of Denmark, while Switzerland makes and exports many kinds of cheese. Much cheese is made also in Holland, France, and Italy.

403. **Forests.**—Spain, Italy, Greece, and other countries once had larger forests than now. The trees were carelessly cut away, and now the people need much more wood than they have, while the steep hillsides have lost their soil from heavy washing by rains and torrents. To repair the damage Germany and France have planted many trees, and these countries, with some others, now watch over the forests carefully. Cutting of timber is regulated by law, and precautions are taken to prevent fires. There is considerable timber in Norway, Sweden, and northern Russia. There are many wood-pulp factories in Norway and Sweden.

In most European countries wooden houses and barns are few, as timber is too valuable to use for building purposes, except for doors, window frames, sash, and interior finish. Brick and stone are used for the walls, and the roofs are covered with tiles. Many European cities, seen from a church tower or a mountain side, look red because this is the color of the roof tiles.

404. **Mining.**—Iron and coal are most necessary minerals, as they are extensively used in all lines of modern industry. They are mined in Great Britain, France, Belgium, and Germany, and iron is mined also in Sweden and Spain. Gold and silver are not found in large quantities, but the mines of tin, lead, zinc, copper, quicksilver, and salt are important. Clay pits and stone quarries have been worked for centuries, especially in regions where the people build chiefly with earth materials instead of wood.

405. **Manufactures.**—Europe is the manufacturing center of the world. Many things are made as skillfully elsewhere, but no other continent has so many workers engaged in manufacture, or sells so many manufactured goods. Many of the raw materials they produce, and others they import. They cannot raise enough wool or silk for their factories, and they raise only a little cotton, but the money they receive for manufactured articles pays for their labor and buys more raw materials. Europe manufactures for the world, and Argentina, Australia, and Canada cultivate the soil and raise crops for the world. The United States is great both in manufacturing and in agriculture, but still it buys from Europe fine fabrics, artistic objects in gold, silver, and other metals, carved woodwork, toys, pictures, drugs, chemicals, and countless other things.

The great manufacturing nations are in western Europe. Russia devotes most of its labor to farming and buys the greater part of its finer manufactured goods. The people of the Balkan countries are backward and unskillful in most manufacturing.

Review.—1. What was the extent of the Roman Empire? 2. What are the Latin nations of to-day? 3. What are the Teutonic nations? 4. What races are found in eastern Europe? 5. How can a small continent support so large a population? 6. What are the principal republics of Europe? 7. Which of these recently became republics? 8. What other form of government is found in Europe?

9. What forms of Christian faith prevail in the several parts of Europe?

10. What is the unit of money in Great Britain? In France? In Germany? In Italy? 11. What are some of the differences between European and American railroads?

12. What are the principal grains raised in southern Europe? In northern Europe? 13. Where is wine culture important? 14. What vegetable products are much raised in Germany? 15. What countries produce the most from dairies? 16. Give an account of building materials in Europe. 17. Why is western Europe a great manufacturing region?

Fig. 387
Physical and Political
BRITISH ISLES
Scale of Statute Miles
0 25 50 75 100
87 MILES TO ONE INCH
Capitals ◎
Principal Railroads thus:
ELEVATIONS IN FEET
2000 TO 5000
1000 TO 2000
500 TO 1000
SEA LEVEL TO 500
COPYRIGHT, BY AMERICAN BOOK COMPANY
THE MATTHEWS-NORTHRUP WORKS, BUFFALO, N. Y.
SHETLAND ISLANDS
St. Magnus Bay
MAINLAND
FOULA
YELL
UNST
FETLAR
BRESSAY
Sumburgh Head
FAIR ISLE
NORTH RONALDSAY
WESTRAY
SANDAY
ORKNEY ISLANDS
HOY
SOUTH RONALDSAY
Pentland Firth
Dunoansbay Head
Thurso
Wick
Ben Moor
Morven
Butt of Lewis
C. Wrath
Ben More Assynt
The Minch
Moray Firth
Cromarty
Banff
Kinnaird Head
Peterhead
Nairn
Inverness
Keith
Aberdeen
Ben Macdhui
Loch Ness
Fort William
Ben Nevis
Ardnamurchan Pt.
Montrose
Arbroath
Dundee
Perth
Firth of Tay
Firth of Forth
Fife Ness
Kirkcaldy
Stirling
Leith
Edinburgh
Berwick on Tweed
Glasgow
Paisley
Hamilton
Kilmarnock
Greenock
Cambridge
Ayr
Galashiels
Hawick
Dumfries
Carlisle
Workington
Whitehaven
Solway Firth
Mull of Galloway
Tynemouth
South Shields
Sunderland
Gateshead
Hartlepool
Middlesbrough
Darlington
Scarborough
Flamborough Head
York
Leeds
Bradford
Hull
Spurn Head
Humber R.
Fleetwood
Preston
Blackburn
Halifax
Huddersfield
Oldham
Bolton
Salford
Manchester
Grimsby
Liverpool
Birkenhead
Sheffield
Lincoln
Chester
Crewe
Stoke upon Trent
Derby
Nottingham
Burton
Leicester
Birmingham
Wolverhampton
Coventry
Rugby
Northampton
Cambridge
Ipswich
Bedford
Luton
Harwich
The Naze
Cromer
Kings Lynn
Norwich
Great Yarmouth
Lowestoft
Canterbury
Dover
Folkestone
Calais
Oxford
Chiltern Hills
Stratford on Avon
Gloucester
Stroud
Swindon
Reading
Windsor
Croydon
London
West Ham
Thames R.
North Foreland
Aldershot
North Downs
Salisbury
Winchester
South Downs
Hastings
Brighton
Southampton
Portsmouth
ISLE OF WIGHT
Bournemouth
Weymouth
Portland Bill
Lyme Bay
Exeter
Dartmoor
Devonport
Plymouth
Penzance
Lands End
Falmouth
Eddystone Lighthouse
Bristol
Bath
Taunton
Trowbridge
Bristol Channel
Cardiff
Newport
Swansea
Carmarthen Bay
Fishguard
Carmarthen
Brecon
Merthyr
Pembroke
St. David's Head
St. George's Channel
Cardigan
Cardigan Bay
Aberystwyth
Llandrindod Wells
Shrewsbury
Wrekin
Severn R.
Wye R.
Dee R.
Mersey R.
Trent R.
Humber R.
Wash
Holyhead
Anglesey
Carnarvon
Carnarvon Bay
Snowdon
Conway
Rhyl
Wrexham
Chirk
Llangollen
Welshpool
Newtown
Kidderminster
Worcester
Hereford
Ross
Monmouth
Usk
Abergavenny
Pontypool
Newport
Cardiff
Swansea
Merthyr
Brecon
Llandovery
Aberystwyth
Cardigan
Cardigan Bay
Pembroke
Carmarthen
Fishguard
Haverfordwest
Milford Haven
Tenby
Carmarthen Bay
Swansea
Neath
Port Talbot
Bridgend
Cardiff
Newport
Chepstow
Severn R.
Bristol Channel
Lundy I.
Barnstaple
Bideford
Ilfracombe
Taunton
Bridgwater
Wells
Glastonbury
Yeovil
Dorchester
Weymouth
Portland Bill
Lyme Bay
Exeter
Dartmoor
Devonport
Plymouth
Penzance
Lands End
Falmouth
Eddystone Lighthouse
Scilly Is.
ENGLISH CHANNEL
Strait of Dover
Beachy Head
Dieppe
Cherbourg
Alderney
Channel Islands
Guernsey
Jersey
Havre
FRANCE
NORTH SEA
ATLANTIC OCEAN
IRISH SEA
Hebrides
Sea of the Hebrides
Barra Passage
Barra
Rum
Coll
Tiree
Staffa
Iona
Colonsay
Jura
Islay
Kintyre
Arran
Firth of Clyde
Firth of Lorne
Giant's Causeway
North Channel
Malin Head
Bloody Foreland
Moville
Lough Foyle
Londonderry
Donegal Mts.
Sperrin Mts.
Larne
Belfast
Lough Neagh
Lough Erne
Donegal Bay
Bundoran
Enniskillen
Armagh
Mourne Mts.
Erris Head
Sligo Bay
Sligo
Mts. of Ballina
Mayo
Achill I.
Westport
Clew Bay
Clew Mask
Dundalk
Dundalk Bay
Drogheda
Slyne Head
Mts. of Connemara
Lough Corrib
Lough Ree
Athlone
Galway
Galway Bay
Roscommon
Dublin
Dublin Bay
Kingstown
Tullamore
Central Plain of IRELAND
IRISH FREE STATE
Shannon R.
Liffey R.
Boyne R.
Barrow R.
Nore R.
Suir R.
Slaney R.
Lough Derg
Lough Dan
Wicklow Mts.
Wicklow
Carlow
Kilkenny
Limerick
Tipperary
Tralee
Loop Head
Dingle Bay
Killarney
Lakes of Killarney
Mts. of Knocknealdown
Blackwater R.
Waterford
Carnsore Pt.
Wexford
Youghal
Cork
Queenstown (Cobh)
Cork Harbor
Kinsale Harbor
Bantry
Bantry Bay
Mizen Head
Cape Clear
FASTNET ROCK
Isles of Scilly
Channel Islands
Alderney
Guernsey
Jersey
Longitude West 6° from Greenwich
10°
8°
6°
4°
2°
0°
12°
58°
56°
54°
52°
50°

Fig. 388. Newcastle on Tyne, from the river; a great center of coal mining, manufacture, and commerce

THE BRITISH ISLES

	Area, Sq. Mi.	Population	Capital
Great Britain, etc.	89,030	42,918,000	London
Northern Ireland	5,320	1,250,000	Belfast
Irish Free State	27,040	3,140,000	Dublin

Map Study.—1. What is the latitude of Lands End? Of the Shetland Islands? What part of North America is included between these latitudes?

2. What waters separate Ireland from England and Scotland? 3. On what river is Liverpool in northwestern England? 4. On what waters are Dublin and Belfast in eastern Ireland? 5. What indentations of the Scottish coast lead to the cities of Glasgow and Edinburgh?

6. Locate the following seaports: Newcastle and Hull, in eastern England; Southampton and Bristol, in southern England; and Cardiff, in Wales. 7. Locate Birmingham, Sheffield, Leeds, and Manchester, in central England.

8. Give the position and direction of the Pennine Chain. 9. Locate the Strait of Dover, and use the scale of miles to ascertain its width.

406. Names and Position.—The British Isles include two large islands and many smaller ones, with a total area greater than that of New England and New York together. For a long time these islands were united under one government as the United Kingdom of Great Britain and Ireland. Early in 1922, however, most of Ireland was organized as the Irish Free State with its own government. Great Britain consists of England, Wales, and Scotland, and, with Northern Ireland, constitutes the United Kingdom.

Because of its island position, Great Britain has never kept as large a standing army as several of its continental neighbors. It has always maintained a powerful navy, however, as well as a great merchant marine, for otherwise ships of a hostile nation could cut off its food supply and stop its trade with foreign countries, as was attempted during the World War. Many of the people of these islands have been sailors, explorers, and traders in all parts of the world; and even after the destructive World War Great Britain has more ships than any other country.

France is only twenty-one miles from England across the Strait of Dover, and by short voyages from British or Irish ports passengers and goods may reach Norway, Sweden, Denmark, Germany, the Netherlands, and Belgium. It takes but a few days for ships to go from these islands to American or Mediterranean ports. Swift steamers cross the English Channel and the North Sea and connect the railways of the islands with those of the continent. Quick railway journeys to Paris, Rome, Berlin, Constantinople, and Moscow are thus made possible. Great Britain is centrally located among the great trading nations of the world.

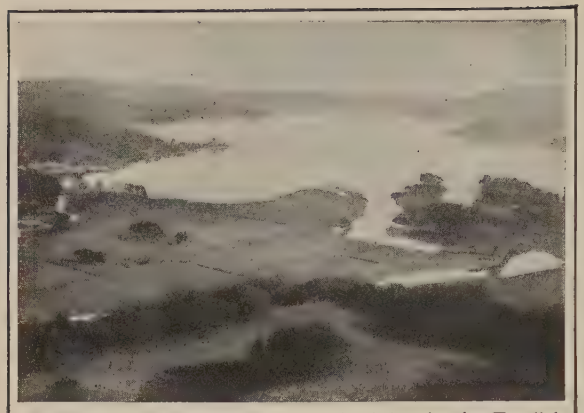

Fig. 389. Windermere, one of the lakes in the English Lake district

GREAT BRITAIN

407. Surface.—England and Wales have highlands in the west and north. Wales is a region of low mountains and of many valleys. The highest point is the top of Mt. Snowdon, 3570 feet above the sea. The peninsula between the English Channel and Bristol Channel is an upland, and the English lake district, in the northwest, on Solway Firth and the Irish Sea, is mountainous (Fig. 389). The Pennine Chain is a range of low mountains running north and south through the middle of northern England. Central and southeastern England is a lowland which is flat in some parts and hilly in others. A part of the lowland between the mouth of the Humber River and the Wash is so low that banks are built to keep out the sea and the area is drained by pumps. The country is small and the rivers are short, but many have been made navigable by dredging and the use of dams and locks.

The Highlands of Scotland are in the central and northern part of that country. As a whole this region is rocky and barren; Ben Nevis, 4406 feet in altitude, is the highest mountain in the British Isles (Fig. 390). The southern part of Scotland also is a highland, but it is not so high or rugged as the northern part. Between the highland in the south and the Highlands of the north is the Scottish lowland. The Firth of Forth and the Firth of Clyde are deep indentations in the east and west, and along their shores and between their heads are fertile lands and large deposits of coal and iron. Here on the river Clyde is Glasgow, the largest city in Scotland and the second largest in Great Britain, and near the Firth of Forth is Edinburgh, the famous old Scottish capital.

408. Climate.—Because of its position, Great Britain has an oceanic climate, with no extremes of temperature (Sec. 385). The winters are not severe, and the snow that falls does not remain long. In fact it is possible to do out-of-door work throughout the year. American visitors find the midsummer days cool enough to be very comfortable, though the Englishmen may call them hot.

On the Scilly Islands, a small group off Lands End, the climate is so mild that the chief business is the raising of flowers, bulbs, and early vegetables for the city markets. In the western highlands of Wales, England, and Scotland the rainfall is heavy and grass grows abundantly. In the Highlands of Scotland especially the rainfall is so frequent and heavy that agriculture is not profitable, but there are fine pasture lands and many of the people are shepherds. In eastern England the rainfall is only about 25 inches a year; and yet the fields and gardens there

Fig. 390. Ben Nevis, Scotland

Fig. 391. Farms in Scotland

are green and fresh through the summer, because there is no great heat to dry the ground and wither the plants.

409. Agriculture. — In spite of the care with which the soil is tilled, British farmers raise only a small part of the food needed by the British people. In the south and east of England, where the rainfall is least abundant and the winters cool, much wheat is grown, an average of 32 bushels per acre being maintained. This is much more than is usually produced on an acre in the United States. Yet the population of Great Britain is so dense that it has to import the greater part of its wheat and flour from the United States, Canada, Argentina, and other lands.

In the more moist portions of England and in the Scottish lowlands, barley and oats and many potatoes are raised because they thrive in a cool, moist climate in which wheat will not ripen (Fig. 391). Immense quantities of garden vegetables are also raised in various parts of the country, and root crops, such as turnips and mangels (a kind of beet), are raised as food for stock. Corn does not thrive, because the summers are too cool.

A considerable part of the more rainy portion of the island is in meadow and pasture. Cattle, sheep, horses, and hogs are numerous. The dairy industry is very large, but not enough butter and cheese are produced to supply the needs of the population and some must be imported. Young cattle are imported from Ireland to be fattened for market in English pastures. British mutton has a reputation for its excellent quality. English agriculture has improved since the World War, largely because the higher prices of agricultural produce have made it profitable to bring under cultivation land that had been left idle or used only as pasture.

The fields in Great Britain, as in many other parts of Europe, are very carefully cultivated. The roads are narrow and winding, and roads, fields, and railways are commonly bordered by neat hedges. Many trees grow in the meadows and pastures, and buildings and walls are often covered with graceful, luxuriant growths of ivy. The soft, rich green of grass and trees and the well-kept fields and roads make the English countryside (or rural England) very beautiful.

410. Metropolitan and Industrial England.—London is the metropolis of the kingdom and the center of many railways leading to all parts of England, Wales, and Scotland. The district south of a line drawn from the Wash on the east to the Bristol Channel on the west is the great farming region of England; but it is commonly called metropolitan England because its only very large city and trade center is the metropolis London.

North of the line described lies industrial England, so called because the people are mainly devoted to the manufacturing industry. Here are all the very large cities of England except London, and in this district practically all the work in iron, woolen, and cotton is carried on. Great Britain is chiefly known for its manufacturing. If this industry and the income from shipping did not furnish money to buy food and raw materials of many kinds in foreign lands, Great Britain might not be able to support more than a third of its present population.

Fig. 392. Coal fields, and principal industrial centers and ports of Great Britain

411. Iron and Coal.—Great Britain could never have taken such a lead in the world's affairs without its large supplies of coal and iron (Fig. 392). One of the great coal fields of England is about Newcastle, on the Tyne (Fig. 388), in the north of England. This city not only exports coal, but makes iron and steel and builds some of the largest steel ships that cross the oceans. Another great coal field is in Yorkshire, east of the Pennine Chain. This supplies coal for the iron and woolen industries of Sheffield, Leeds, and many other cities. Sheffield has made fine grades of steel for hundreds of years, including the finest pocket knives, shears, and other kinds of cutlery.

Other coal fields are found in central England, near Birmingham. This is one of the chief cities of England, and its special industry is the working of iron. Here and in the neighboring towns there are so many chimneys, coal pits, and heaps of waste that the region is called the "black country." It is very different from the clean and quiet parts of rural England which lie around it. The "forest of Arden" formerly surrounded Birmingham, and the people made charcoal and used it in little shops, to work the iron. Now most of the work in iron and steel is done in factories which turn out pens, nails, screws, and needles by the million, as well as all kinds of machinery.

There is one other important coal field in England, in the county of Lancashire, west of the Pennine Chain. It is the region about Liverpool, the great port, and Manchester, the chief center of the cotton industry.

A large supply of coal is found in the South Wales coal field. This coal is taken to Cardiff, the principal seaport of Wales, on Bristol Channel; much is used there in the iron furnaces, and much is exported. Cardiff is the principal coal-exporting city of the world. British ships carry coal to sell in France, Italy, Argentina, and many other foreign countries, and to supply coaling stations which Great Britain owns in various parts of the world, including Gibraltar, Malta, the Bermudas, St. Helena, and the Fiji Islands. Such coaling stations are necessary because even the largest ships carry only coal enough to go a few thousand miles.

Coal fields in the Scottish lowlands provide a convenient supply of fuel for Glasgow and other manufacturing cities in Scotland.

Many deposits of iron are close to the coal beds in England and Scotland, and much is brought in ships from Sweden, Spain, and other countries. Modern building, manufacturing, and transportation both by land and by sea, require the use of iron and steel in great quantities. Great Britain has iron for ships, tools, railroads, and machinery, and the coal to work the iron, drive the ships, and run the factories. These two minerals have done much to make Great Britain the greatest manufacturing nation of the world, even in industries for which the raw material must be brought from distant lands.

412. Cotton Manufacture.—The manufacture of cotton goods is the largest industry in Great Britain, and yet every fiber of the raw material must be imported. The United

Fig. 393. Manchester ship canal, bordered by wharves

States supplies more cotton than any other country, though much comes from Egypt and India. Much of the cotton is brought by sea to Liverpool and then sent by rail or boat to the manufacturing towns in Lancashire. Manchester is the greatest city in the cotton district, and is the money and banking center for the cotton trade. The city of Manchester has dug a ship canal $35\frac{1}{2}$ miles long and 28 feet deep from Manchester to the sea (Fig. 393), so that cotton and other freight can reach the city without stopping in Liverpool.

About two fifths of all the cotton spindles of the world are in England, and more than half of the product, in value, is turned out by English mills. There are several reasons for the greatness of the industry.

(1) Englishmen first invented the machinery that was needed. More than one hundred years ago two men, named Hargreaves and Arkwright, invented machines for spinning cotton, which made it possible to turn out more and better goods and thus decrease their cost. In those days woolen manufactures were much more important than those of cotton, but now the cotton industry is much the larger of the two. At first the workmen were very angry over the inventions of Hargreaves and Arkwright, because they feared that the machines would enable a few men to do the work and that many men would have no employment. The demand for cotton manufactures has so increased in all parts of the world, however, that now far more workmen find employment than before.

(2) Lancashire, the great cotton-spinning region, is in the rain belt of western England (Secs. 385, 408), and the moist air is favorable to working the delicate fibers of the cotton (Fig. 394).

(3) The manufacturing region is favorably located for ocean trade. The estuary of the Mersey allows large ships to reach Liverpool, so that the cotton is brought by water close to the mills, and a short haul carries the cotton goods back to the sea again.

(4) The enterprise of the British people has led to the development of trade with all parts of the world. Even the United States, which raises and manufactures so much cotton, buys some English cotton goods. Raw

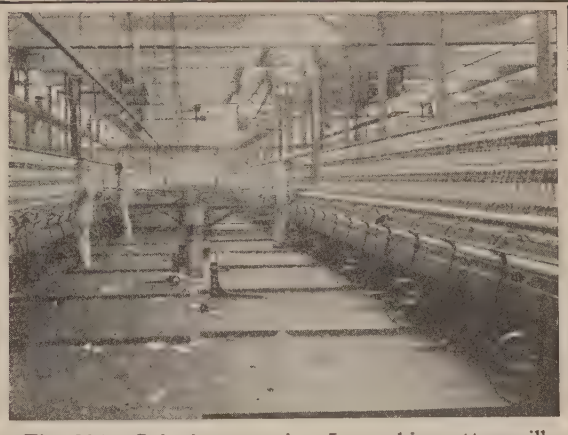

Fig. 394. Spinning room in a Lancashire cotton mill

cotton may be sent from Texas fields to England, there made up into cloth, and finally sent back to Mexico, to be sold just across the Rio Grande from the state in which it was grown. At the same time the breadstuff for the operatives comes to Liverpool from North America, Argentina, Egypt, and other countries, while cattle and beef and dairy supplies are shipped in from Canada, Argentina, Australia, and New Zealand.

413. Woolen and Other Manufactures.—Leeds is the center of woolen manufacture, and other cities near it have a share in the industry. All these cities are near the Yorkshire coal fields, which furnish the power to run the machinery. Woolen manufacture began there because sheep were kept on the pastures of the Pennine Chain. Now, although Great Britain still has many sheep and produces much wool, more than three fourths of the wool needed in its factories is imported. Australia sends the most, while Argentina and South Africa send some.

Fig. 395. Shaping pottery by use of the potter's wheel

There is a great demand for British woolen goods. Many kinds of woolen cloth are brought from Great Britain and sold in American stores and tailor shops. One of these is worsted, which took its name from a village of that name in eastern England. Another is the tweeds, which are made at a number of places in the lowlands of Scotland. Broadcloths, cashmeres, merinos, and serges also are made of wool, as are likewise many kinds of the best carpets.

The most important manufactures in Great Britain are those of iron, cotton, and wool; but there are many others. In addition to the making of cotton and woolen cloth, the textile industries of the country include some manufactures of silk and of linen. The making of pottery, including fine china, is another British industry (Fig. 395). There are many breweries, distilleries, and factories for making jams and marmalades, which are favorite articles of diet in Great Britain.

414. Commerce.—Great Britain usually has a larger foreign commerce than any other country; but since Great Britain is small and has less than half the population of the United States, its internal or domestic trade is much less than ours. Most of the British foreign trade is carried in British ships; and these, as well as many ships for other countries, are built in the shipyards of Great Britain. Newcastle (Sec. 411) has the largest shipyards of England, but Glasgow, together with the bank of the lower Clyde, is one of the chief shipbuilding districts of the world.

Great Britain has many seaports. Like other parts of Europe, it has an irregular coast line, with numerous bays and tidal rivers or estuaries. The water of a number of these rivers is deep enough for ships to go many miles into the country. No place in the country is more than 70 miles from a seaport. This gives the manufacturers an advantage, for it costs less to carry goods by ship than by rail. In the United States it is not unusual to carry manufactured goods 500, or 1000, or even 2000 miles by railroad.

Fig. 396. Liverpool landing stage

Fig. 397. British shipping at London

There are four principal ports on the west coast. The second in size, but first in commerce, is Liverpool, on the river Mersey (Fig. 396). No other foreign city has so great a trade with the United States. Ships run to Boston, New York, Philadelphia, and many other ports. Cotton ships dock here from Galveston, New Orleans, and Savannah. From Liverpool ships go to all the British colonies and to all other countries. Not only the cotton, but most of the grain and meat from foreign countries enters Great Britain here. The wheat prices for the world are fixed chiefly by the condition of the Liverpool market.

First in size, but second in commerce, of the western ports is Glasgow. It has not only shipyards, but also factories for making locomotives, and is the great center and outlet for the products of the Scottish lowland. Ships sail between Glasgow and American ports, and some of them call at Londonderry, in the north of Ireland.

Bristol and Cardiff are also important seaports, though neither of them ranks with Liverpool or Glasgow.

There are three principal ports on the English Channel: Plymouth, Portsmouth, and Southampton. Plymouth has long been a British naval station, Portsmouth has the largest of the government navy yards, and Southampton is a convenient port for London. Many English ships sailing from New York have their terminal there, and some ships of other nations call there on voyages to and from America.

The mails between Great Britain and the United States are sent mainly through Southampton, Plymouth, and Liverpool. The larger steamships carry mails between Southampton and New York. Other fast ships leave American mails at Plymouth to be sent by train to London. Many of the slower steamships ply between New York and Liverpool, handling Irish mails at Queenstown (Cobh) in the south of Ireland.

England has three first-class ports on its east shores. One is Newcastle on the Tyne (Sec. 411). Another is Hull (Fig. 398), on the Humber, an outlet for the iron and woolen manufactures of Sheffield, Leeds, and other cities, with lines of ships that run to North Sea and Baltic ports and to many other parts of the world. The third and by far the most important port is London (Sec. 416).

415. Fishing.—As Great Britain is surrounded by water, fishing has become an important industry both along the coast and offshore, where such food fish as cod, haddock, and herring are taken in great numbers.

Fig. 398. Fish wharves at Hull

Approximately 70,000 men from Great Britain are engaged in this occupation. Many seaports share in this industry, though much of it has been concentrated at a few large ports on the North Sea. Among these are Hull (Sec. 414), Grimsby, and London in England, and Aberdeen in Scotland. Fresh fish are carried from these ports to market by fast trains and form a large part of the food supply in many parts of the country (Fig. 399).

Fig. 399. Sorting fish for market

416. London.—London is the capital of Great Britain and of the British Empire, and is the largest city of the Old World. The center of London is on the river Thames, fifty miles from its mouth. The place is an excellent site for a city, because it is at the head of the tidewater, and even before the time of the Romans in Great Britain, it was a convenient place for crossing the river. King Alfred the Great made London the capital of England more than a thousand years ago. The city has grown up on both sides of the river, though most of the important streets and buildings are on the north side. London Bridge is the oldest of several bridges that now join the two parts of the city.

London is the center of British railways. They run out in all directions to the principal seaports and to Scotland. Trains are swift, and no one is allowed to cross the tracks at stations or to walk on them in the country. More railroad tickets are sold each year in Great Britain than in the United States, but the average length of each journey is less.

Every British citizen thinks much about London and talks about "going up to London." This is because the city is so great and the land so small. London has about one sixth of the population of Great Britain.

London leads all other cities in its commerce. Its docks stretch down the Thames more than twenty miles, and the cargoes unloaded there come from all parts of the world. They are brought here, not only for use in Great Britain, but to be reshipped to many other ports, for Great Britain is a great trading nation and London a great trading center. Tea, coffee, spices, sugar, petroleum, wool, rubber, and hides are among the imports, some of which are again exported. The export trade is smaller than the import trade, because the chief manufacturing district is in the north of England, nearer Liverpool and

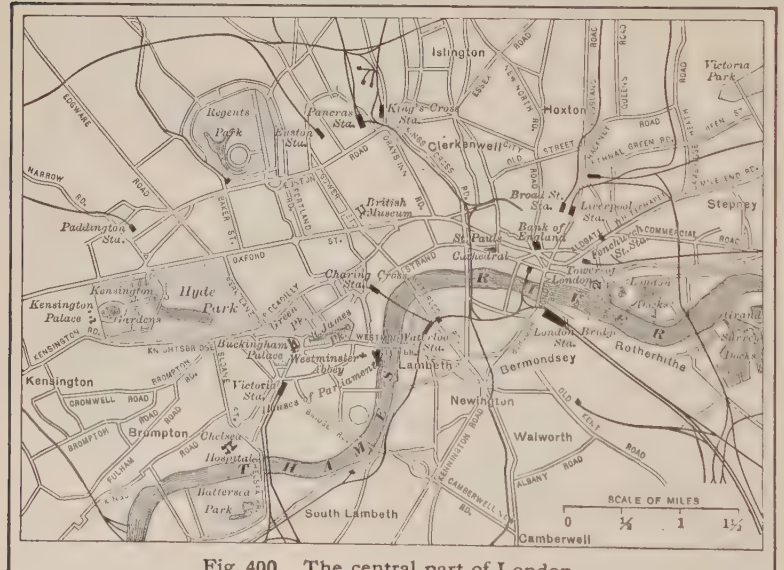

Fig. 400. The central part of London

Hull. London, however, is a great manufacturing center, with automobile works and many factories.

London has long been a money center, not only of the British Empire, but of the world. Much of the business is conducted through the Bank of England. The money transactions of New York, however, now exceed those of London.

London, like other European cities, does not allow very high store or office buildings to be erected, such as we see in some of our own cities. Many of the streets are narrow and crowded and not suited to railroad tracks. Most of the public travel is by taxicabs and huge omnibuses. There are extensive subways also, which the Londoners call "tubes."

Fig. 401. Greenwich Observatory

Fig. 402. Trafalgar Square, London

Among the great buildings are St. Paul's Cathedral and Westminster Abbey. In the Abbey are buried many famous British statesmen, writers, heroes, and men of science. The Tower is a great square building on the Thames, in which, in former centuries, many famous men of the kingdom were imprisoned, and some of them executed. The British Museum has vast collections in art and science, and one of the two largest libraries of the world, the other one being the National Library in Paris. In the eastern part of London, on the river Thames, is the Greenwich Royal Observatory, from whose meridian longitude is usually reckoned in all countries (Fig. 401).

Fig. 403. One of the colleges at Oxford—Christchurch

Only a short journey from London are the largest and most ancient of the British universities, Oxford (Fig. 403) and Cambridge. There are universities also at London, Sheffield, Manchester, Liverpool, Edinburgh, and other places.

417. Government and Colonies.—The form of government in Great Britain is now such that the people have almost entire control, while the king and the nobles have little power. The House of Commons is made up of members elected by the people, and is the chief source of legislation. The House of Lords is composed of members of the nobility and the bishops of the established church —the Church of England. The two houses

form the *Parliament* of the kingdom (Fig. 404). The king appoints as *Premier* the leader of the party in power, and the Premier selects a *ministry* of leading statesmen for the management of the departments of government.

Fig. 404. Houses of Parliament, London, where the Parliament meets

In the early days of America Englishmen founded several colonies, including Virginia and Massachusetts. Many Scotch, Irish, and Welsh people also came here in order to have religious freedom, or a better opportunity to earn a living.

At the time of our Revolutionary War Great Britain lost the colonies which formed the United States. But British colonies have at various times been established in other parts of the world, and are still members of the British Empire. While some of these have their own governments and are almost independent, they favor Great Britain in trade and in other ways.

In America, the empire includes Canada, Newfoundland, British Honduras, and British Guiana, besides Jamaica and several smaller islands of the West Indies. There are important British colonies in several parts of Africa, and in southern Asia. Australia and New Zealand and many smaller islands in the Pacific, Atlantic, and Indian oceans are under British rule. British possessions are so extensive (Fig. 350) that it is a common saying that the sun never sets on the British flag. The sons of British families go out and manage the farms, tend the ranches, work the mines, build the cities, and organize the governments of the colonies. For this reason the ideas and books, the commercial enterprise and ingenuity, of the English people are now found in all parts of the world. The English language is spoken by more people than any other European tongue.

Review.—1. What advantage has Great Britain from its island position? 2. Describe its surface and climate.

3. In what parts of Great Britain are wheat and oats chiefly raised? 4. Where is metropolitan England? Why is it so called?

5. Locate the chief coal fields of Great Britain. Name the chief cities which are dependent on them for fuel for their manufactures. 6. What advantages for cotton manufacture has the Lancashire district? What countries supply the raw material for this manufacture? 7. What is the leading city in English woolen manufacture? What countries supply the raw wool?

8. What is the principal center for shipbuilding in England? In Scotland? 9. Give an account of Liverpool; of Southampton; of Hull.

10. Describe the location of London and state its advantages. 11. What is the character of the commerce of London? 12. Why is Westminster Abbey a noteworthy church?

13. Describe the government of Great Britain. 14. What is the extent of the British Empire?

IRELAND

418. Irish Free State, and Northern Ireland.—Most of the people of Ireland have long objected to English rule. In 1922, after conferences between representatives of the Irish people and the British government, it was arranged to divide the island into two parts. A small region in northeastern Ireland remained with Great Britain in the United Kingdom, but the rest of the island was formed into the Irish Free State, with a government like that of Canada or Australia.

Taken as a whole, Ireland has low mountains on its borders, but in the central part there are low plains, suitable for meadows, pasture lands, and for some crops. Some of the best farming land is in Northern Ireland, where crops of hay, oats, barley, flax, potatoes, and roots are large and a fine grade of grass seed is grown.

Fig. 406. Hay field near Killarney, Ireland

Northern Ireland is the chief flax-growing region of the island, because the plant thrives in a cool climate. In preparing the flax the plants are pulled, dried, and the seeds removed. They are then put into pools of soft water to loosen the fibers and make it possible to comb them out and get them ready for weaving. Much of the fiber goes to Belfast, where it is made into linen. The best Irish linens are very beautiful and bring high prices. Belfast is noted also for its great ship yards, where large ocean ships are built (Fig. 405).

The Irish Free State is largely an area of grass land, with grazing and dairying as the chief industries (Fig. 406). It is this region that furnishes the young cattle sent to England to be fattened. There is some farming in the southern section of the country, but much of the land has been impoverished by poor farming methods and the returns are not large. In the western part, where the population is dense, most of the land under cultivation has been won from bog or mountain.

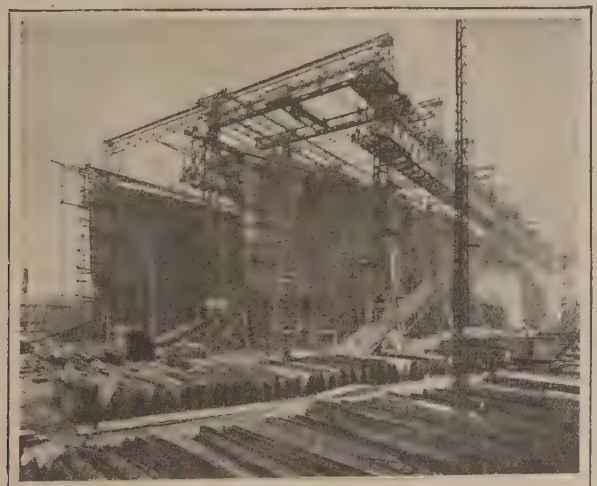

Fig. 405. Shipbuilding, Belfast. Two vessels on the stocks, in process of building

There is but little coal in Ireland and therefore but little manufacturing. Many of the people depend upon peat for fuel. In the swampy lands, of which there are many in the low-lying parts of this island with a heavy rainfall, mosses and other plants have grown freely. As the country is never hot or dry, the moisture of the swamps prevents decay, and in time the plants form a brownish vegetable substance called peat. This peat when cut out in blocks and thoroughly dried burns well and is extensively used as a domestic fuel.

Dublin is the chief city of the Irish Free State and has become an important ship-building and brewing center. In recent years it has grown rapidly in size, even while the country districts have been gradually losing in population.

Review.—1. What is Northern Ireland? What crops are grown there? 2. How is flax prepared for spinning? 3. In what city is linen chiefly manufactured? 4. What are the chief industries of the Irish Free State? 5. Where is the farming region of the Free State? 6. What is peat and for what is it used? 7. Where is Dublin, and what industries are carried on there?

Fig. 407. Physical and Political
GERMANY
POLAND
AND OTHER COUNTRIES ON THE NORTH AND BALTIC SEAS
Scale of Statute Miles
0 50 100 150
140 MILES TO ONE INCH
Capitals: ⊙ Railroads:
ELEVATIONS IN FEET
OVER 5000
2000 TO 5000
1000 TO 2000
500 TO 1000
SEA LEVEL TO 500
LAND BELOW SEA LEVEL
NORTH SEA
BALTIC SEA
Gulf of Finland
Gulf of Riga
Helsingfors
Leningrad (Petrograd)
Narva
Reval (Tallinn)
Rakvere
Haapsalu
Paide
Parnu
Dorpat (Tartu)
Pskov
Novgorod
Lake Peipus
Lake Ilmen
ESTHONIA
DAGÖE (HIIUMAA)
ÖSEL (SAAREMAA)
Kuressaare
Windau (Ventspils)
Riga
Cesis
Tukums
Mitau (Jelgava)
Bauska
Libau (Liepaja)
LATVIA
Rezekne
Dvinsk (Daugavpils)
Telšiai
Šiauliai
Memel (Klaipeda)
LITHUANIA
Panevežis
Raseiniai
Ukmerge
Vitebsk
Kurisches Haff
Niemen R.
Konigsberg
Kovno (Kaunas)
Vilna (Wilno)
Suwalki
Lida
Minsk
Grodno
Bobruysk
Berezina R.
Dnieper R.
Danzig
Gulf of Danzig
Frisches Haff
EAST PRUSSIA
Bromberg (Bydgoszcz)
Torun
Mława
Łomza
Białystok
Slonim
Vistula R.
Plock
POLAND
Warsaw (Warszawa)
Siedlce
Brest-Litovsk
Pinsk
Pripet R.
Bug R.
Kalisz
Łódź
Radom
Piotrków
Kielce
Lublin
Chelm
Kowel
Łuck
Równo
Zhitomir
Berdichev
Kiev
UKRAINE
Oppeln
Czestochowa
Dabrowa
Sosnowice
Bedzin
Katowice
Krakow
Tarnow
Przemysl
Lemberg (Lwow)
Tarnopol
GALICIA
Teschen (Cesyn)
Stanislawow
Kolomea
Kamenets Podolsk
Dniester R.
Czernowitz
RESSARABIA
RUMANIA
Prut R.
Berlin
Potsdam
Frankfort on the Oder
Posen (Poznan)
Charlottenburg
Brunswick
Magdeburg
Hanover
Osnabruck
Bremen
Hamburg
Altona
Lubeck
Kiel
Rostock
Stettin
Oder R.
Elbe R.
Weser R.
Rhine R.
Ruhr R.
Saale R.
Havel R.
Spree R.
Netze R.
Warta R.
Pomeranian Bay
Stettiner Haff
Lubeck Bay
Kiel Canal
Flensburg
Schleswig
Cuxhaven
Bremerhaven
Wilhelmshaven
Emden
Leer
Oldenburg
Munster
Dortmund
Elberfeld
Barmen
Gottingen
Cassel
Halle
Leipzig
Dresden
Gorlitz
Breslau
Erfurt
Gotha
Jena
Chemnitz
Reichenberg
Plauen
Karlsbad
Eger
Prague
Pilsen
Brunn
Budweis
Nuremberg
Bairoutl
Wurzburg
Darmstadt
Mannheim
Frankfort on the Main
Wiesbaden
Mainz
Coblenz
Cologne
Dusseldorf
Duisburg
Essen
Bonn
Aachen
Crefeld
Munchen-Gladbach
Rheydt
Venlo
Roermond
Maastricht
Liege
Verviers
Meuse R.
Rhine R.
Moselle R.
Saar R.
Saar Basin
Metz
Nancy
Karlsruhe
Baden
Stuttgart
Strasburg
Ulm
Augsburg
Munich
Ratisbon
Danube R.
Danube Plateau
Bavarian Highlands
Black Forest
Vosges Mts.
Belfort
Mulhouse
Besancon
Basel
Constance L.
Inn R.
Vienna
Pressburg
Budapest
HUNGARY
CZECHOSLOVAKIA
Bohemian Highlands
Erzgebirge
Harz Mts.
Thuringian Forest
Rhenish Slate Mts.
Ardennes
Waterloo
Brussels
Antwerp
Ghent
Bruges
Mechlin
Louvain
Namur
Charleroi
BELGIUM
Amsterdam
Haarlem
Leiden
The Hague
Rotterdam
Utrecht
Arnhem
Nijmegen
Tilburg
Groningen
Zuider Zee
Waal R.
Lek R.
Yssel R.
NETHERLANDS
Helgoland (Ger.)
W. Frisian Is.
E. Frisian Is.
N. Frisian Is.
Heligoland Bight
Frisian Is.
Skagerrack
Kattegat
Christiansand
Arendal
Larvik
Skien
Drammen
Oslo (Christiania)
Frederikstad
Frederikshald
Skagen
Aalborg
Randers
Aarhuus
Horsens
Odense
FYEN
ZEALAND
Copenhagen
Korsor
MOEN
FALSTER
LAALAND
Helsingor
Helsingborg
Landskrona
Lund
Malmo
Trelleborg
BORNHOLM (Den.)
RUGEN
Goteborg
Jonkoping
Orebro
Upsala
Malar Lake
Eskilstuna
Stockholm
Norrkoping
Linkoping
Kalmar
OLAND
GOTLAND
Karlskrona
Skaggerack
Kattegat
SWEDEN
NORWAY
DENMARK
Longitude East from Greenwich
5° 10° 15° 20° 25°
55° 50°
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286

Fig. 408. Docks at Hamburg, the chief German seaport

GERMANY

AREA, 179,500 sq. mi. POP., about 60,000,000. CAPITAL, Berlin.

Map Study.—1. Name in order the countries that border Germany on the north, west, south, and east. 2. Describe the courses, in Germany, of five important rivers. 3. What are the latitudes of Berlin and of Washington? 4. Name the leading seaport on the Elbe River; three Baltic Sea ports. 5. Locate Breslau, Leipzig, and Dresden. 6. Locate Munich and Nuremberg. 7. What seas are joined by the Kiel Canal?

419. Physical Geography.—Northern Germany is a plain sloping from altitudes of a few hundred feet down to the North and Baltic seas. All the greater rivers of Germany, except the Danube, flow northward across this plain, which extends from the Netherlands on the west through Russia on the east.

Middle Germany consists of hills and low mountains, some of which are covered with forests. In southern Germany the Danube and its branches cross the Bavarian Plateau, while farther west are the Black Forest and the valley of the middle Rhine. On the southern border the country includes a part of the Alps, with summits nine or ten thousand feet high.

Germany has land boundaries on the west, south, and east. On the north is Denmark, but the rest of the northern border is a part of the shore line of the Baltic and North seas.

The climate is not so moist or so even as that of Great Britain, nor is the country so dry or subject to such extremes of heat and cold as Russia. The western parts of Germany have more rain and milder temperatures than the eastern parts. Southern Germany, on account of its greater elevation, is no warmer than the northern half of the country. Like Great Britain and like most of central and northern Europe, Germany is cloudy in winter, while bright days prevail in Italy.

The northern plain, which was covered by the ice-sheet (Sec. 379), has many lakes, sand flats, and moraine hills. As southern Germany was at one time covered by ice moving northward from the Alps, this region also has drift soils and many lakes.

420. History and Government.—For centuries there were many German states, each more or less independent. Some were kingdoms, and others were known as *grand duchies*, *duchies*, *principalities*, and *free cities*. Until 1806 they were loosely banded together in an empire, which at times was too weak to prevent wars among the different states. At length, in 1871, a new German Empire was founded, under a constitution which made the central government strong and powerful. By war with France, it annexed the provinces of Alsace and Lorraine, west of the Rhine.

In the World War Germany again attempted to add to its territory, but was

Fig. 409. States of Germany and territories ceded by treaty of 1919

defeated and lost the territories shown in Fig. 409, including Alsace-Lorraine, which was returned to France. To Poland Germany lost still larger areas, including a large region around the city of Posen, extending northward to the Baltic Sea. The part of Prussia around Konigsberg, though still a part of Germany, is thus cut off from the rest of the country. After a plebiscite, or vote of the people, the eastern part of a mining region on the upper Oder River (Fig. 409) was also given to Poland. A part of Schleswig was by vote of its people added to Denmark. A small area on the western border was ceded to Belgium, and the coal beds of the Sarre Basin were turned over to France. Moreover, as security for the carrying out of the treaty, it was agreed that French and other Allied troops should occupy the land west of the Rhine, with small areas east of it.

In 1918 the imperial government of Germany was overthrown and the country adopted a republican form of government, with a president, a Reichstag or legislative assembly, and equal suffrage for all classes and for both sexes. The country is made up of eighteen states, large and small, each with a republican government.

421. The German People.—After the war of 1870 and the formation of the empire, the population increased rapidly until the opening of the recent war. At present the population is greater than that of any other country in Europe except Russia.

Under the empire the people were trained to industry and strict obedience to law. The royal families, the nobility, and the rich expected service from those who belonged to the laboring classes, who tilled the fields, worked in the factories, and carried on the small trades. Class feeling was strong and it was rarely possible for a poor or obscure boy or girl to rise to wealth or to important public positions.

The German people did, however, give much care to education. The schools of all grades are taught by well trained teachers. There are more than twenty universities, of which those of Berlin, Leipzig, Munich, and Heidelberg are among the best known.

422. Agriculture.—Rye and barley are the principal grains, for they thrive best in a cool climate, and the poorer people eat a great deal of rye bread. Much wheat is raised and a large amount of wheat flour is manufactured, but not enough to supply the needs of the people; therefore wheat and flour are also imported. Germany surpasses all other countries in the quantity of potatoes raised, and also in the amount of beet sugar made. Much of the sugar is not needed at home, and is sold in other countries. Many of the farms in Germany are small, and the farmers live in villages and go out each day to their work.

Fig. 410. Castle, town, and vineyards on the Rhine

In the Rhine country there are extensive vineyards, the grapes from which are used in making wine. This part of Germany joins France and the Swiss lowland, which are also regions of grape raising. Along the Rhine and the Moselle the people have, with great labor, terraced many of the steeper slopes, so that the soil is held in place and more vines can be grown (Fig. 410). The vineyards of Germany extend farther north than those of any other country of Europe.

Much attention is given to the raising of live stock. Hogs are fed on the ground pulp of sugar beets from which the juice has been extracted, and on nuts from the forest.

423. Forests and Mines.—For many years Germany has given attention to forest development. About one fourth of the surface is covered by forests, which belong partly to the German states and partly to private owners. The private owner, however, cannot cut trees as he may wish, for he is required by law to preserve the woods. This he does by cutting only mature or ripe trees and by replacing them with young ones. A German forest looks like a densely wooded park (Fig. 411). The majority of the trees are evergreen, including many pines. The beech is also common. The woods are cared for by men trained in the profession of forestry.

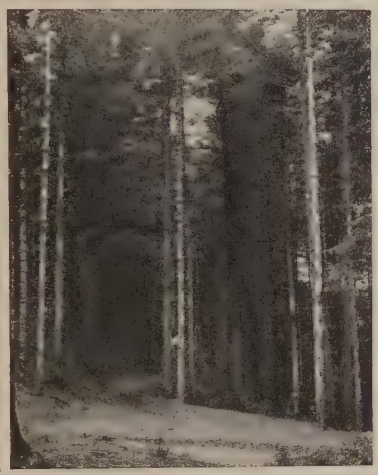

Fig. 411. German fir forest

Germany has many mines and quarries. There are beds of coal and of iron ore in several German states. There are also mines of silver, lead, and zinc, and wonderful deposits of common salt and of potash salts. In the southern part of Germany, near the Danube, are quarries of lithographic stone. This rock is a limestone of very fine grain, which is cut into smooth slabs and sent to various parts of the world for making plates used in the production of maps and posters.

424. Manufactures.—Germany is a great manufacturing nation and factories are common in all parts of the country. The greatest concentration of industries, however, is found in the basin of the Rhine below Cologne. Here are vast deposits of coal along the Ruhr, a small river

Fig. 412. Power plant near Berlin. Here an abundance of cheap coal is converted into electrical current

Fig. 413. Shipbuilding at Stettin

Fig. 414. The Reichstag Building, Berlin

flowing into the Rhine from the east. Essen is a center for iron and steel. Some of the iron ore lies close at hand and the rest is brought by ship from Spain and Sweden. It is in this part of Germany that most of the textiles are manufactured, including cotton, woolen, and silk goods.

Outside of the lower Rhine district, Saxony has the most extensive manufactures, including large centers for iron, textile, and printing industries. Industries are also highly developed in and about Berlin. Among German specialties of manufacture are instruments of precision, and drugs, dyes, and a great variety of other chemical products.

In the woodland parts of the country, wood carving is carried on by thousands of peasants and others in their homes, at times when work cannot be done in the fields and vineyards. Toys, clock cases, and carved furniture of all kinds are made.

In many German cities the workmen have acquired skill in making watches, jewelry, and all kinds of gold and silver ornaments and utensils. This work is done especially in Berlin, Nuremberg, Munich, and Augsburg. Fine china is made, the Dresden china being well known. The brewing of beer, a common beverage in Germany, is a large industry.

425. **Commerce.**—Germany has many states, and its domestic commerce is large. Railways have been laid out, rivers improved, and canals constructed, so that the cities and people of the interior may trade with one another and may readily reach the seaports. Most of the railroad lines are owned and operated by the German states. The larger rivers improved for navigation have been joined to one another by canals (Sec. 384).

The population of Germany is so large that much foodstuff must be imported. Because there are many factories, raw materials, as cotton, wool, silk fiber, iron ore, and crude rubber, must also be brought in. Before the World War the foreign trade and the shipping of Germany were large. The terms of peace adopted in 1919 compelled the country to surrender most of its merchant ships in compensation for ships which were destroyed in sea warfare. Its carrying trade was therefore for several years much reduced.

The greater part of the oversea trade enters Germany by way of the North Sea; therefore Bremen and Hamburg (Fig. 408) are more important than the ports on the Baltic. These two ports, as well as Stettin and Kiel, are shipbuilding centers (Fig. 413).

426. **Chief States and Cities of Germany.**—Prussia, somewhat smaller than California, is by far the largest of the German states (Fig. 409). Its capital, Berlin, is also the capital of the country (Fig. 414).

Berlin is one of the three cities of the

world that have more than 3,500,000 people. It is in the midst of the north German plain and lies between the Elbe and Oder rivers. Smaller rivers and canals join it to these rivers and afford navigation for its commerce. Railroads have been built across the lowland and reach out in every direction to the different parts of the country and to all parts of the continent. The manufactures of Berlin are extensive and include the making of machinery, steam engines, and a great variety of woolen goods. The city is also a banking center and has the largest of the German universities and various museums of art and industry.

Breslau is a large city in southeastern Prussia, on the river Oder. It is near coal fields and has important manufactures.

The most western part of Prussia is the country along the Rhine. It is not only noted for the beauty of its scenery and for its ancient castles, but is also known for its manufactures and commerce. Here on the Rhine are Cologne, with its cathedral and its manufactures of Cologne water, sugar, chocolate, and tobacco; and Dusseldorf, a handsome residential city and a center of iron and textile manufacturing. Not far from the Rhine are Essen, the iron-manufacturing center (Sec. 424), and the great textile cities Barmen and Elberfeld. These two cities are so closely connected that they really form one center of population and industry. Frankfort on the Main is a financial and trading center and takes its name from a branch of the Rhine on which it stands.

Saxony is a state south of Prussia, on each side of the Elbe. Its capital is Dresden, where a variety of artistic objects are manufactured, including china, and where there are large art galleries, libraries, and scientific collections; Dresden is a resort for students of music and painting. Leipzig also is in Saxony, and is the most important center in Germany for the printing of books. Chemnitz is another large city of Saxony; its chief industries are in iron work and textiles.

Fig. 415. The city of Munich

The second largest German state is Bavaria, in the south. It is crossed by the Danube and has the Alps on its southern border. Its chief city is the capital, Munich (Fig. 415), which has important collections of pictures and manufactures a variety of artistic objects, including bronzes and stained glass. This city is one of the chief brewing centers of the country. Another great Bavarian city is Nuremberg (Sec. 424).

Hamburg is the second city of Germany, with a population of about one million. Other important cities are Hanover, Stuttgart, and Magdeburg.

Review.—1. Briefly describe the surface of Germany. 2. Compare the climate with that of Great Britain. 3. When was the former German Empire established? 4. Describe the form of government recently adopted. 5. What recent changes have been made in the boundaries of Germany?

6. Name four of the leading products of the soil. 7. Give an account of the care taken of the forests. 8. What useful kind of stone is exported? 9. In what parts of Germany are important concentrations of industry found? 10. What industry is common in the forest regions?

11. Name the largest German state. 12. Give the main facts about Berlin. 13. Name and locate two German cities that have important picture galleries. 14. Locate two important cities on the Rhine, and two leading seaports.

OTHER COUNTRIES ON THE NORTH AND BALTIC SEAS

	Area, Sq. Mi.	Population	Capital
Belgium	11,760	7,684,000	Brussels
Netherlands	12,772	6,841,000	The Hague
Denmark	16,585	3,289,000	Copenhagen
Norway	124,710	2,646,000	Oslo
Sweden	172,928	5,904,000	Stockholm
Poland	149,000	27,442,000	Warsaw
Lithuania	25,000	2,300,000	Kovno
Latvia	24,000	1,503,000	Riga
Esthonia	18,500	1,110,000	Reval

Map Study (Fig. 407).—1. Give the boundaries and locate the capital of the Netherlands; of Belgium; of Denmark. 2. In what country is Amsterdam? Antwerp? 3. What river crosses Belgium and the Netherlands? 4. Give the latitude of the North Cape (Fig. 371). 5. What countries occupy the Scandinavian Peninsula? 6. Name and locate the capital of each. 7. What countries are east of the Baltic Sea? 8. Locate Warsaw; Riga.

BELGIUM

427. Size and Population.—Belgium is not very much larger than New Hampshire or Vermont, and yet it has a greater population than all New England, important manufactures, and a very great foreign commerce. There are more than 600 people for each square mile in the kingdom. No other country in Europe is so densely populated.

There are two main languages in Belgium. The people in northern Belgium, next to the Netherlands, use the Flemish language, which is much like the speech of their Dutch neighbors. In southern Belgium the people speak French, as their neighbors do over the border in France. The Belgian money unit is the franc, as in France.

Fig. 416. Milk peddler, Belgium

Fig. 417. Lace making, Belgium

428. Industries.—Northern Belgium has a low, flat surface; some of it has been made habitable by building embankments to shut out the sea. The natural streams on this lowland, as well as the many canals that have been dug, make it easy to travel and to transport goods by water. Southern and eastern Belgium are hilly, with forests and many mines, and in this respect southern Belgium is like that part of France which borders it. Valuable deposits of coal, iron, zinc, and lead are found there, and southern Belgium is one of the busiest manufacturing regions in the world. All kinds of glassware and iron and steel goods, as well as cotton, woolen, and linen goods, are made there (Fig. 417).

The people have long been skillful workers in wool; centuries ago Flemish weavers, because of their great skill, were taken to England to improve the woolen industry there. In the early development of the textile manufactures Belgium raised most

of the necessary wool and flax; no cotton goods were made at that time. Now much of the wool and all of the cotton are imported.

The flat lowlands are used mainly for agriculture. The principal crops are hemp, flax, hops, sugar beets, chicory, and a variety of garden vegetables. The farms are small, are worked with great care, and are more like large gardens than like the farms we know. Much food has to be imported, but the manufactures furnish money to pay for it. The foreign trade of Belgium is larger than that of any other small country except the Netherlands.

Fig. 418. City Hall, Brussels

429. Cities and Commerce.—Brussels is the capital (Fig. 418), and has many manufactures, among which those of lace and carpets are important. Antwerp, on the river Scheldt, is the chief seaport of Belgium. It is one of the greatest seaports of Europe, and its ships go to America and all other parts of the world. Belgium has, through Antwerp, a large transit trade; that is, it receives many foreign goods and sends them on to other countries of Europe. Liege is the important city of the hilly interior, and the chief manufacturing center of Belgium. It is in a region of large coal fields, and manufactures woolen goods and steel goods, including firearms.

Belgium controls nearly all of the great Congo River basin in Africa, and trades in its rubber and other products.

THE NETHERLANDS

430. Surface.—The Netherlands is often called *Holland*, the name of one of its provinces. The whole country is a little larger than Belgium, and about one fourth the size of the state of New York. The land is a low plain, like northern Belgium, which adjoins it. Several rivers cross the country, of which the Rhine is the largest. Much of the southern part of the Netherlands belongs to the delta of this great river. A large bay, the Zuider Zee, deeply indents the northern half of the country.

The name *Netherlands* means that the land is low. Indeed much of it lies lower than the surface of the sea. Several centuries ago the inhabitants, the Dutch people, began to build embankments around the coast swamps. These embankments are called *dikes*, and there are now many hundred miles of them. In places they are as much as thirty feet high. The lowland within is kept free from water by pumping, and is occupied by farms and towns. For centuries the pumping has been done by means of the large windmills often seen in pic-

Fig. 419. A dike in Holland, used as a roadway

Fig. 420. Windmills in Holland

tures of this country (Fig. 420). Now some of the pumping is done by means of steam. The people are very industrious and determined, and long ago when their liberties were threatened by the armies of Spain, they sometimes opened the dikes and flooded the lands, in order to defeat the enemy. Many canals are needed to drain the lands and to carry away the water, and these form a network over the country and are used by boats. In some cities, as in Amsterdam, there are canals in many of the streets.

431. Industries.—Clay is abundant, and bricks, tiles, and pottery are made in large quantities. There is not much coal or iron in the country, and hence the people are engaged more in farming than in manufacturing. They raise live stock and cultivate many vegetables, fruits, and flowers for home and foreign markets. One of their exports is flower bulbs, of which many are sent to the United States. Many of the tulips, hyacinths, and other flowers seen in American lawns and gardens are grown from Dutch bulbs (Fig. 421). Other important exports are poultry, eggs, butter, and cheese (Fig. 422).

432. Commerce and Cities.—The Dutch have always been stubborn fighters, good traders, and excellent sailors. Like the early English and Spanish navigators, they helped to find new lands. The Dutch still have rich possessions in the East Indies and some small islands in the West Indies. Java and other islands in the East Indies furnish coffee, spices, and other products, which Dutch merchants carry to Europe and sell in many markets. The Dutch have a greater foreign trade than any other nation except the United States, Great Britain, Germany, and France.

The capital is a city known as the Hague. It has a splendid art gallery. Rotterdam is one of the world's greatest seaports. Its harbor is used not only by many seagoing ships, but also by river steamers that connect it with Dusseldorf, Cologne, and other cities on the Rhine.

Fig. 421. A field of tulips at Haarlem, Holland

Fig. 422. Cheese market

Amsterdam, near the south end of Zuider Zee, is the largest city of the Netherlands. It is built on a number of islands connected by bridges. A canal joins the Zuider Zee and the port of Amsterdam with the North Sea. Thousands of diamond cutters carry on their industry in Amsterdam, and thousands more do the same in Antwerp. The jewels cut in these two great cities of the Netherlands and Belgium find their largest market in the United States.

Fig. 423. Copenhagen, the great port of Denmark

Review.—1. What is the density of population in Belgium? 2. What languages are used there? 3. Name the capital and two other cities of Belgium. 4. Give an account of Antwerp. 5. What are the main industries of Belgium?

6. What part of the Netherlands belongs to the delta of the Rhine? 7. Describe the means by which the Dutch people have reclaimed much of their country from the sea. 8. In what ways has the position or the character of the country affected the occupations of the people? 9. What interesting export of the Netherlands comes to our country? 10. Give an account of the diamond-cutting industry. 11. Where are the colonial possessions of the Dutch people?

DENMARK

433. Land and Industries.—Denmark consists of the larger part of the peninsula of Jutland, and of several large islands in the Baltic Sea. On one of these islands is Copenhagen, the capital, one of the large cities of Europe (Fig. 423). All the shipping that enters or leaves the Baltic Sea must pass Copenhagen, unless it goes by the Kiel Canal.

Fig. 424. Danish women carrying pails of milk

The land is low and flat or gently rolling. The soil is not of the best, and the climate is too cool for any but hardy crops. Oats, barley, and rye are the chief cereals, but the main industries are dairying (Fig. 424) and the raising of swine and poultry. There are so many cows that some cattle food is imported, including much cottonseed meal from the United States. The chief export is butter, which is sent to Great Britain. The skimmed milk is fed to poultry and hogs. Pork and eggs are produced in large quantities for export.

There are no minerals of value, except clay. Fuel must be imported, and manufactures cannot be large. There are many peat bogs, as in Ireland, and some fuel is taken from them.

434. Iceland.—The king of Denmark is also the king of Iceland, in the north Atlantic. Iceland is a cold country, especially on the north. Sheep, cattle, and horses are raised, some fish are caught, and the eider duck furnishes eider down for export. In Iceland there are volcanoes and geysers.

Greenland and the Faroe Islands belong to Denmark.

Fig. 425. Haying in Norway. Because of the moist climate, the grass is placed on trellises to dry

NORWAY

435. Surface.—The Scandinavian Peninsula is bordered by the Atlantic and Arctic oceans, and by the Baltic Sea and the Gulf of Bothnia. It includes two separate kingdoms, Norway and Sweden. Most of Norway, except in the south, is so mountainous that there is little cultivated land, although there is much pasture. Inlets of the sea, called *fiords*, penetrate deeply into the mountains, and for hundreds of miles the coast is bordered by islands. Ships can go along the coast and far into the interior, in quiet, safe waters.

436. Industries.—There are fewer people in Norway than in Denmark. They get their food and other necessaries of life in several ways. They raise many potatoes and other vegetables and a little grain. They keep cattle and produce much milk, butter, and cheese. The grass in the meadows is fine and short, and when it is cut, it is laid on frames or trellises to cure, because in the moist air it would spoil on the ground if the farmers tried to dry it as is done in our country (Fig. 425). In the summer, members of the farmer's household drive the cattle up into the mountains and live there, watching the cattle and making the butter and cheese. Sometimes they draw up supplies and send down the produce on a long tight wire that reaches from the valley home up to the mountain dairy house.

Lumbering, the manufacture of pulp and paper, condensing milk, and smelting are important industries. Some of the waterfalls are used to develop electricity, and the electrical energy is carried long distances to the mills.

Thousands of Norwegians find work during part or all of the year in the fishing fleets. Like their Viking forefathers, they are good sailors, and Norwegian ships are seen in all parts of the world, carrying the goods of many countries.

437. People and Cities.—Norwegians live among mountains like the Swiss people, but they are also accustomed to the sea, like the Dutch. The hardships of their life are such as to make them a very vigorous people. Many good citizens of the United States, especially west of the Great Lakes, have come from Norway and settled on the fertile prairies. Norwegians speak the same language as the people of Denmark.

Oslo, formerly named Christiania, is the capital and the largest city and the chief industrial center. It has nearly one tenth of the total population of Norway. Bergen is the second city and the chief fish market.

SWEDEN

438. Industries.—Sweden is less mountainous than Norway, and has a greater area of fertile soil suitable for grain, hay, and pasture. Dairying is an important industry, and butter is exported to England. More than half of the country is covered with forest. Much wood pulp and paper are made, besides many other wood products. Hundreds of sawmills, planing mills, and furniture factories are kept busy; and the exports of timber and of articles made of wood are far larger than any others. The forests are protected by limiting the amount of timber that may be cut each year.

Fig. 426. A waterfall in Sweden

Sweden has deposits of iron ore that are among the largest and best in Europe, and there are many iron furnaces. Some of the iron ore is sent to other countries, especially to England. The Sheffield factories buy much of it for making steel tools. As in Norway, electrical energy is developed at waterfalls (Fig. 426), and this power is used in the wood-working and iron-working industries.

Fig. 427. Parliament House, Stockholm

The Swedes do not sail so many ships as the Norwegians; but they have more agricultural land, more timber, and more minerals with which to make their living.

Stockholm is the capital and largest city of Sweden (Fig. 427). It is an important port, although closed by ice in winter. Goteborg, in the southwest, close to Denmark, has an open port and a large trade. Swedes, like Norwegians, have come to our country and are prosperous citizens of many of our states.

439. Climate of Sweden and Norway.—In both the Scandinavian countries the summer season is short, but the summer days are long. In southern Sweden the midsummer night is only about six hours long. At Trondhjem, the old capital of Norway, a July night lasts about four hours. At the North Cape, for several weeks in the summer, the sun does not set at all, and this is "the land of the midnight sun."

Although the growing season is short, and wet or cloudy days are frequent, the crops have the benefit of some long sunny days. It is for this reason that grain and vegetables can grow rapidly and ripen quickly so far north.

Review.—1. Where is Copenhagen? Why is its position important? 2. What is the main agricultural interest of Denmark? 3. Give an account of Iceland.

4. Describe the shore line of Norway. 5. How are the farming and dairy industries carried on during the summer? 6. What are the other large industries? 7. What facts make Bergen an important city?

8. In what respect is Sweden inferior to Norway? 9. In what industries does it surpass Norway? 10. What is the length of midsummer nights in various parts of the Scandinavian Peninsula? 11. State the location and importance of Stockholm; of Goteborg.

POLAND AND THE BALTIC STATES

440. Poland.—Poland became a separate kingdom nearly one thousand years ago. During long periods it embraced large areas in central and eastern Europe. In general the Carpathian range formed the southern boundary and the Baltic shore was the northern limit. More than one hundred years ago the country was divided among the sovereigns of Prussia, Russia, and Austria. Notwithstanding prolonged persecution the Poles kept their language, their national feeling, and their desire for independence.

Following the World War the Polish people gained their freedom and reunited under a republican form of government. The western boundary of Poland was located partly by the treaty of 1919 and partly as the result of a plebiscite (1921) in the rich coal-mining region of upper Silesia (Fig. 409). The eastern boundary was agreed upon after a hard-fought war between Russia and Poland in 1920.

The Vistula is the great river of Poland and most of the country lies in its basin. On its upper waters and not far from the Carpathian Mountains is Krakow, the ancient capital (Fig. 428). Near the middle of the country on the banks of the river is Warsaw, the present capital (Fig. 429). The city has about 900,000 people and is the chief railway center. Railway lines connect Warsaw with Krakow and Vienna, Berlin, Danzig and the Baltic Sea, Leningrad, Moscow, and Odessa. Posen is an important city in the region recovered from Germany.

Fig. 429. Market in the Jewish quarter of Warsaw

The country is low and flat, except for the foothills of the Carpathians and the glacial hills in the north. In this northern or glacial region there are many lakes and large swamps. A large part of this area is covered with forests.

The leading occupation is agriculture, and the principal crops are rye, oats, wheat, potatoes, and sugar beets. Fine horses, cattle, and sheep are raised. The manufactures include cotton and other textiles, leather, iron, and steel. These industries center

Fig. 428. Bread market in Krakow

Fig. 430. A group of Polish peasant women

Fig. 431. Polish farm house, with roof of thatch

mainly in Warsaw and Lodz. The latter city is especially known for its cotton mills.

Among the mineral resources are coal, iron, zinc, and salt. Not far from Krakow are some of the most remarkable salt mines in the world. The beds of salt are of great thickness and extend for several hundred miles. Like other beds of rock salt they are due to evaporation of sea water in ancient periods of time. Near Krakow is a mine with 48 miles of galleries at different levels down to 900 feet. It has been worked for hundreds of years and is like an underground town. The province of Galicia also has a large output of petroleum.

441. Danzig.—Danzig was for centuries a Polish city but in the dissolution of Poland it came under the rule of Prussia, and it is now peopled mainly by Germans. It is the great seaport at the mouth of the Vistula, and is the chief outlet available for the foreign trade of Poland. At the close of the World War it was internationalized and was made a free city under the care of the League of Nations. Definite privileges in the use of docks and railways are given for the promotion of Polish commerce.

442. Small Baltic States.—Three small countries on the eastern shore of the Baltic Sea have declared their independence of Russian control and have set up republican governments. They are Esthonia, which lies south of the Gulf of Finland; Latvia, on the Gulf of Riga; and Lithuania, which is south of Latvia. Each of these countries is larger than Denmark, but has a smaller population. The Letts and Lithuanians belong to the white race and use kindred forms of speech. The Esthonian language is of Mongolian origin.

Latvia includes the important commercial city of Riga, at the mouth of the Duna, a navigable river flowing out of Russia. The lands of all these countries were covered by the ice sheet of northern Europe, and contain many lakes and swamps and much forest. Lumbering, fishing (Fig. 432), and agriculture are the principal industries.

Review.—1. Outline the history of Poland. 2. Name and locate three important cities on the Vistula River. 3. What is the leading industry of Lodz? 4. What are the chief mineral deposits found in Poland? 5. Give an account of the salt mines. 6. Where is Danzig? 7. Why was this city internationalized at the close of the World War? 8. Name and locate the small Baltic states. 9. What important city is in Latvia? 10. What are important surface features of these countries?

Fig. 432. Fishing boats and sailing vessels at Libau, a Baltic port

Fig. 433
Physical and Political
FRANCE
SPAIN AND PORTUGAL
Scale of Statute Miles
0 50 100 150 200
149 MILES TO ONE INCH
Capitals of Countries: ⊙
Principal Railroads:
ELEVATIONS IN FEET
OVER 5000
2000 TO 5000
1000 TO 2000
500 TO 1000
SEA LEVEL TO 500
COPYRIGHT, BY AMERICAN BOOK COMPANY
ATLANTIC OCEAN
North Sea
English Channel
Bay of Biscay
Mediterranean Sea
Gulf of Lion
Gulf of Valencia
Gulf of Cadiz
Strait of Dover
Strait of Gibraltar
IRELAND
Queenstown
WALES
Cardiff
ENGLAND
London
Rotterdam
NETHERLANDS
Ostend
Ghent
Dunkerque
Antwerp
Brussels
BELGIUM
Liege
Aachen
Dusseldorf
Cologne
Krefeld
Calais
Boulogne
Lille
Dover
Southampton
Plymouth
Lands End
Dieppe
Amiens
Cherbourg
Havre
Rouen
CHANNEL IS. (British)
Caen
Reims
Verdun
Metz
Versailles
Paris
St. Denis
Nancy
Brest
St. Malo
Pte. St. Mathieu
Britt a n y
Rennes
Le Mans
Troyes
Colmar
Mulhouse
Belfort
Lorient
Orleans
Besancon
Basel
Angers
Tours
Dijon
Bern
SWITZERLAND
L. Geneva
St. Nazaire
Loire R.
Nantes
Le Creusot
Macon
Geneva
Mt. Blanc
Rochefort
Clermont Ferrand
Lyon
Limoges
Gironde R.
Cognac
St. Etienne
Grenoble
Mt. Cenis
Bordeaux
Dordogne R.
Avignon
Nimes
Montpellier
Nice
MONACO
Bayonne
Toulouse
Lourdes
Marseille
Toulon
The Riviera
Perpignan
C. Ortegal
Ferrol
Gijon
Santander
San Sebastian
Coruna
Oviedo
Bilbao
C. Finisterre
Vitoria
Pamplona
ANDORRA
Burgos
Ebro R.
Braga
Valladolid
Oporto
Douro R.
Zaragossa
Barcelona
Salamanca
Tarragona
Coimbra
Sa. de Gata
Sa. de Guadarrama
Iberian Peninsula
Tortosa
Covilha
Madrid
Sa. de Gredos
Castellon
Toledo
Tagus R.
Valencia
Lisbon
Setuba
Elvas
Evora
Badajoz
Almaden
Almoy
Sierra Morena
Linares
Alicante
Murcia
Cordoba
Jaen
Lorca
Huelva
Seville
Granada
Cartagena
C. St. Vincent
Faro
Palos
Jerez
Sierra Nevada
Almeria
Cadiz
Malaga
Algiers
Gibraltar (British)
Tangier (Neutral Zone)
Ceuta
Tetuan
Oran
Melilla
(To Spain)
MOROCCO
AFRICA
ALGERIA
BALEARIC ISLES (Spain)
MINORCA
MAJORCA
CABRERA
IVIZA
FORMENTERA
CORSICA
Same scale as main map
C. Corse
Bastia
CORSICA (French)
Ajaccio
Str. of Bonifacio
SARDINIA (Italian)
5° Longitude West from Greenwich
0° Longitude East from Greenwich
THE MATTHEWS-NORTHRUP WORKS, BUFFALO, N. Y.

Fig. 434. Vineyard in southern France, near Bordeaux. The grapes are used in making wine

FRANCE

AREA, 212,822 sq. mi. POP., 39,210,000. CAPITAL, Paris.

Map Study.—1. What barrier separates France from Spain? From Italy? 2. What countries border France on the east? 3. What waters are on the north, west, and south?

4. Describe the four chief rivers, in respect to their positions and their courses. 5. Locate Havre, Bordeaux, and Marseille. 6. Locate Paris, Lyon, and Lille. 7. With the scale of miles determine the distance between Havre and Marseille. 8. What port of France is opposite Dover in England? 9. Name the westernmost port of France.

PHYSICAL GEOGRAPHY

443. **Climate and Rivers.**—France is much smaller than the state of Texas. It has little waste land, however, and supports about 40,000,000 people. It is farther south than Great Britain and therefore has a warmer climate, especially in the part that borders the Mediterranean Sea. Paris is in latitude 49° north, the same latitude as the boundary between western Canada and the United States.

The central and western parts of France slope toward the Atlantic Ocean and the English Channel, and are drained by three large rivers. To the north is the Seine, on which Paris is situated, with Havre at its mouth. Next southward is the Loire, on which are Orleans and Tours, with the ports of Nantes and St. Nazaire near its mouth. In southern France is the Garonne, with Toulouse on its course and Bordeaux near its mouth. Eastern France drains to the south by the Rhone and eastward to the Rhine. On the Rhone, where the Saone flows into it, is Lyon, and near the mouth is Marseille, the second city of France, and its largest seaport. The Rhone has a large delta, whose flat, swampy land is not suitable for a city, and the large Mediterranean seaport of France is located on higher ground to the east.

444. **Highlands.**—The main highland is in the interior of France, around St. Etienne, and extends to the north, south, and west.

It consists of low, well-worn mountains and hills. France has several uplands on its borders. To the south the high Pyrenees separate it from Spain. They are so high and unbroken that the railways between France and Spain pass around the ends of the range. On the southeast the Alps separate France from Italy. Mont Blanc, the highest peak in Europe, with an altitude of 15,781 feet, is in France (Fig. 435). Between France and Switzerland are the low Jura Mountains, while the Ardennes highlands are on the Belgian border. The Vosges Mountains are in eastern France near the Rhine.

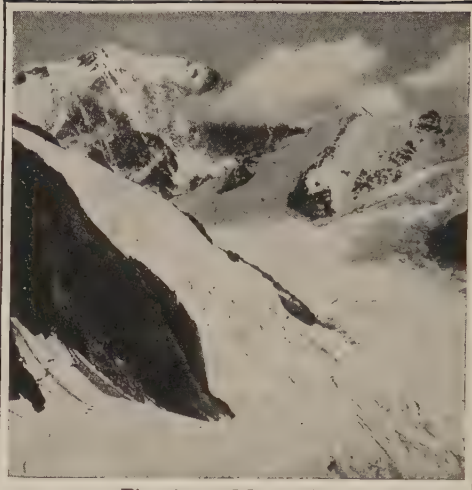

Fig. 435. Mont Blanc

PEOPLE AND INDUSTRIES

445. History and People.—In the time of Julius Cæsar, this region was called Gaul, and he made it part of the Roman Empire (Sec. 387). In modern times it has been sometimes a monarchy and sometimes a republic. Under the Emperor Napoleon Bonaparte the country was for a time greatly enlarged. After many other changes, France in 1871 became a republic, as it is to-day. It has a president, a senate, and a chamber of deputies, and thus has a form of government somewhat like ours.

The French language has been derived from the Latin by many centuries of gradual change. It has long been studied and spoken by educated people in many parts of Europe and in other lands.

The French have good schools, and a great national university which includes many colleges scattered over France. The people are industrious, skillful, thrifty, and patriotic, and are great lovers of all beautiful things. Population has not increased rapidly in recent years, and few French emigrants have gone out to settle in other countries.

Fig. 436. Potash mine, Alsace. Most of the potash is used in fertilizers

446. Alsace-Lorraine.—The provinces of Alsace, on the Rhine, and Lorraine, on the Moselle, were taken by Germany in 1870–1871, but were recovered by France in 1918. They are about as large and as populous as Connecticut and Rhode Island. Their restoration to France is of immense importance because of their mineral resources and manufactures. Lorraine has extensive beds of iron ore. Alsace has great textile industries, vast deposits of potash (Fig. 436), and some salt and petroleum. Its chief city is Strasbourg, which carries on a large trade.

447. Forests and Agriculture.—The French people appreciate the value of trees; they take good care of the forests, plant many young trees, and let no wood go to waste. Even small twigs are cut up and tied in bundles, for kindling.

France is a land of small farms, which are usually owned by the farmers, and not, as so commonly in Great Britain, by the nobility. For this reason the farmers take interest in their land and raise good crops. They raise about one third as much wheat as we do in the entire United States, and, unlike the British, provide nearly all their own bread. The average wheat field in France yields about 20 bushels an acre (Fig. 437). There are many flour mills to prepare the grain for use. The people produce much of their own meat supply and an abundance of fruit and vegetables. They economize carefully and make a small supply go a long way towards a comfortable living. In the fields the peasant women often work beside the men. It is common for the farmers to live in village communities and go out to work in the fields.

Many chestnuts and walnuts are raised, and the walnuts are an export to the United States. We buy them under the name " English walnuts." In the warm southern parts of France olive trees flourish, and the fruit is bottled, or is pressed for the oil. One of the most important products is grapes.

The care of vines, the gathering of the grapes, and the making of wine and raisins are branches of the grape industry. In France the vineyards extend up the Rhone and Saone valleys and into the valleys of the Seine, the Moselle, and the Rhine. All of France south of Paris has valleys where vineyards abound, especially along the Garonne and its branches (Figs. 434, 438). So much wine is made in this southwestern part of the country that Bordeaux is the most important city in the world for trade in wine.

448. Manufactures.—The French do not manufacture so extensively as do the people of the United States or Great Britain, but they make some things extremely well, especially such artistic things as fine jewelry, dress fabrics, laces, tapestries, gloves, and perfumery. For the operation of their large mills and factories part of the coal must be imported, and in the iron and textile industries France does not take rank with Great Britain, which supplies all its own fuel.

Northern France is the region that includes Paris and extends to the English Channel and the Belgian boundary. It has more factories than any other part of the country. This is because there are coal and iron along the Belgian border as there are in Belgium. There are also iron mines in Lorraine, and France owns the coal mines of the Sarre Basin, north of Lorraine.

Bales of cotton and other raw materials are brought by ship to Havre, and from this port they are taken by rail or by smaller boats up the Seine to Rouen and Paris. Paris manu-

Fig. 437. Harvesting wheat, France

Fig. 438. Young grape pickers

factures clothing and many things that require fine skill and artistic taste. At Rouen and Mulhouse are large cotton mills. It was in Rouen that Joan of Arc, a famous French heroine, met her death. Lille makes textile and iron goods. It gives the name to lisle thread, much used in making gloves and hosiery. Amiens, Reims, and other cities make woolens. These two places and Rouen contain celebrated old cathedrals (Fig. 439).

Lyon and the region near it form the second greatest manufacturing part of France. The silk industry is foremost in Lyon (Sec. 449). Southwest of it is St. Etienne, which is near a coal field and has iron works, but much silk ribbon also is made there. Farther north is Le Creuzot, the chief iron-working city of France. It resembles Pittsburgh in the United States and Birmingham in England, but does not equal either of those cities in the amount of its manufactures. Fine porcelain ware is made at Limoges in south-central France, and at Sevres, a few miles from Paris.

Fig. 440. Factories at Lyon on the Rhone

449. Lyon and the Silk Industry.—Lyon is an ancient city at the junction of the Rhone and Saone rivers (Fig. 440). During more than two thousand years the valley of these rivers has afforded a lowland road from the Mediterranean Sea to northern Europe and Great Britain.

All about Lyon are groves of mulberry trees. The leaves are picked and fed to silkworms. When full grown the worms or caterpillars form from their bodies the silk fiber and wind it around themselves, forming cocoons. These very fine fibers are carefully unwound and made into silk thread and silk fabrics. Lyon makes more silk goods than any other city in the world, though other cities have large silk industries. Among these are St. Etienne in France, the chief center for the manufacture of ribbons, and also Crefeld in Germany, Milan in northern Italy, and Paterson in New Jersey. Only part of the silk fiber used in Lyon comes from France. Much of the raw silk is produced in Italy, or is brought in by way of Marseille from China and Japan.

Fig. 439. Cathedral at Reims, which was much damaged in the World War

450. Paris.—Paris, on the Seine, is the capital of France. It is the fourth city of the world, with a population of about 3,000,000. It is one of the most beautiful cities in the world, because of its fine buildings, splendid avenues, its parks, and its works of art. It lies on both sides of the river, which is crossed by many bridges. Around it is much of the most fertile land in France, and railroads run from it to all parts of France and most of the other countries of continental Europe. Ex-

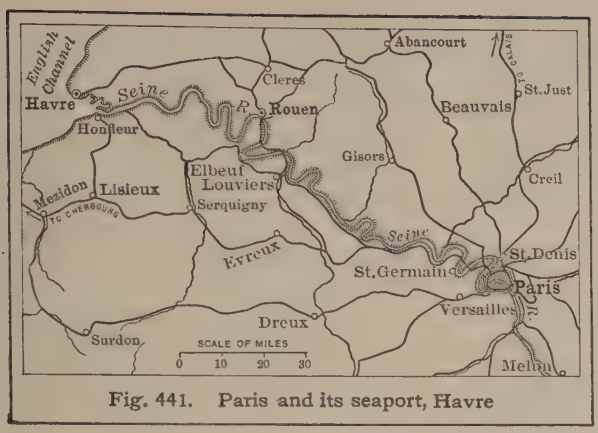

Fig. 441. Paris and its seaport, Havre

press trains go to Rome, Constantinople, Berlin, and Moscow, while a short passage by railway and a channel boat, or a regular airplane service, takes the traveler to London.

The cathedral of Notre Dame in Paris is one of the finest in Europe (Fig. 442), and the Louvre, an art gallery, contains many of the world's greatest treasures in painting and sculpture. Among these is the Mona Lisa, a painting by Leonardo da Vinci, and the Venus de Milo, one of the beautiful Greek statues of an earlier time. Many articles of dress and ornament are made and sold in Paris, which is the world's center for fashionable dress. The exports from Paris to the United States are very large.

451. Waterways and Seaports.—The main rivers have been deepened in places to fit them for navigation, and the larger rivers have been joined to one another by canals (Secs. 383, 384). Freight can thus be taken from Paris northward to Brussels and Antwerp; or eastward to Strasbourg on the Rhine; or southward to Lyon and Marseille. In like manner boats go from Bordeaux up the Garonne River and to Marseille. Starting from the mouth of the Rhone, one could go by boat to Bordeaux; to Nantes by the Loire; to Havre; to Antwerp or to Rotterdam by way of Lyon, Strasbourg, and the Rhine.

Marseille (Fig. 443), Havre, and Bordeaux are the most important seaports. Cherbourg, Boulogne, and Brest are other ports much used in trade with the United States, while Calais and Dieppe are the chief ports of departure for England.

Fig. 442. Cathedral of Notre Dame, Paris

452. The Riviera and Small States on the French Border.—The word Riviera means shore line, but it is especially applied to the coast of southeastern France and northwestern Italy. The region is protected from north winds by high mountains, and it is so warm that palms and oranges grow there, although in the latitude of our northern states. It is a winter resort for Europeans and Americans (Fig. 444).

Fig. 443. Wharf at Marseille

Fig. 444. The Riviera, near the boundary between France and Italy

On this shore is the independent principality of Monaco, containing only eight square miles, and best known because of the resort called Monte Carlo.

At the point where France, Belgium, and Germany come together is the grand duchy of Luxemburg, a hilly region of about 1000 square miles, with a population of about 260,000. It supplies much iron ore to the adjoining manufacturing districts.

The Sarre Basin, between France and Germany, is a little smaller than Luxemburg. It is controlled by the League of Nations, but its rich coal mines belong to France.

The republic of Andorra, in the Pyrenees, is under the protection of France and Spain. It has a territory of 175 square miles, and about 5000 inhabitants.

453. French Foreign Possessions.—The French possessions include parts of Africa, Asia, and South America, and a number of islands (Fig. 350). Algeria and Tunis in north Africa are the most important, and France controls much of the Sahara and Sudan and part of the Congo River region. Other possessions are in Indo-China in southeastern Asia, the island of Madagascar off the east coast of Africa, St. Pierre and Miquelon near Newfoundland, Guadeloupe and Martinique in the West Indies, French Guiana in South America, and many islands in the Pacific Ocean.

Review.—1. Give the size and population of France. 2. Name the highlands on the south and east borders of the country. 3. When did France finally adopt its present form of government?

4. What difference exists between the farms of France and of Great Britain? 5. Give an account of wheat raising in France. 6. Where are the grape districts of the country? 7. Name and locate the chief trading center for wine.

8. Name the chief centers and kinds of manufacture in northern France. 9. Explain why the possession of Alsace-Lorraine is important. 10. Name two cities not far from Lyon, and give their industries. 11. How is silk fiber obtained? 12. What countries produce the most of it? 13. What cities are centers of silk manufacture?

14. Name some interesting buildings in Paris. 15. What are the railway facilities of the city?

16. Describe five routes by which a boat may go by river and canal from the Mediterranean Sea to the Atlantic Ocean, the English Channel, or the North Sea.

17. Where is Andorra? Monaco? The grand duchy of Luxemburg? The Sarre Basin? 18. Name the foreign possessions of France.

SPAIN AND PORTUGAL

	Area, Sq. Mi.	Population	Capital
Spain	192,000	20,784,000	Madrid
Portugal . . .	34,264	5,546,000	Lisbon

Map Study (Fig. 433).—1. Give the land and water boundaries of the Iberian Peninsula. 2. What three rivers have their courses partly in Spain and partly in Portugal? 3. What cities are at the mouths of two of these rivers? 4. What is the chief river of southern Spain? 5. What river of northern Spain flows into the Mediterranean? 6. Name and locate the capitals of the two countries. 7. What group of islands is near Spain on the east? 8. What mountains are in the northern part of Spain? In southern Spain?

454. Physical Geography.—The Iberian Peninsula, including Spain and Portugal, is a little larger than France, and contains about 25,000,000 people. The greater part of the peninsula is a plateau 2000 feet or more above the sea. The lowlands are found in a narrow strip along the coasts and in the valleys of the larger rivers. Above the plateau rise a number of east and west mountain ranges. The highest of these ranges, the Pyrenees and Cantabrian Mountains in the north, and the Sierra Nevada in the south, carry snow on their upper slopes throughout the year. One can stand on the shores of the warm Mediterranean and see the eternal snow fields of the Sierra Nevada.

In the winter the peninsula is in the track of the westerly winds, and the lands near the Atlantic receive rains; but the rainfall in the interior is small. In the summer the northeast trade winds cross the peninsula (Sec. 386), and the rainfall is small. The interior is so far from the sea that its climate is continental, being cold in winter and hot in summer.

The coast line is regular, and there are few good harbors. The rivers do not afford much navigation, both because they flow mainly on the interior uplands, and because the country is too dry to furnish much water.

455. History and People.—At the time of the discovery of America, Spain and Portugal were among the strongest countries in Europe, and they gained great possessions in the New World. They have from time to time lost these, but Spain still holds the Canary Islands and parts of western Africa. Portugal has the Azores Islands and the Madeira Islands (Fig. 350); also large territories in the eastern and western parts of southern Africa, and some small possessions in southern Asia.

Spain is a monarchy, but Portugal in 1910 passed through a revolution and adopted the republican form of government. The Spanish and the Portuguese people have lived from generation to generation without much change of any kind. More than half of the people cannot read or write. There is now some desire to improve, to have better education, better homes, and more liberty. This is shown by the change of government in Portugal, and by the growth of modern industries in some parts of Spain.

The Spanish and Portuguese languages, like the French, are derived from the Latin tongue, and the countries belong with France and Italy among the Latin countries of Europe.

456. Agriculture.—Much of the interior is not suited to crops (Sec. 454), but is used for pasture, especially for sheep, of which many are kept in Spain. It was from the flocks of Spain that the well-known Merino sheep were taken to start flocks in the United States and other countries.

Wheat is the principal grain, and is raised in the north of Spain around Valladolid, and in the basin of the Ebro. All along the coast, from Barcelona to Oporto, orange trees flourish, especially north and south of Valencia, a seaport that exports oranges (Fig. 445). The olive grows in the same belt, and farther north on both coasts. In the interior irrigation is extensively used in raising these fruits. The vine is cultivated also on all the coasts and far up the valleys of the main rivers.

Fig. 445. Sorting oranges for shipment, near Valencia, Spain

Fig. 446. Cork oak

Like France and Italy, the peninsula produces and exports large quantities of wine. Port wine derives its name from Oporto in Portugal. Another important export is cork (Fig. 446), from the bark of the cork oak, which grows in both countries.

457. Cities and Trade.—Spain and Portugal are backward in manufactures, and their chief exports consist of fruits and fruit products and minerals. The railroads are poorly developed, and the rivers are only in a small degree navigable. Most of the commercial centers, therefore, are near the sea.

The chief seaport, and the second city of Spain, is Barcelona, on the Mediterranean. It is also the principal center of manufacturing in Spain, especially of textiles. Valencia is another important seaport because it is in the center of a large irrigated orange region, and ships thousands of boxes of this fruit to foreign countries. It also exports great quantities of onions, raisins, and almonds, which are raised in that part of Spain.

Iron, copper, and lead ores are found in large quantities in Spain. They are shipped from Cartagena and several smaller seaports on the south shore. The greatest port for iron, however, is Bilbao in northern Spain, on the Bay of Biscay (Fig. 448). Much ore is shipped from this place to Great Britain and Germany. As there is coal also not far away, Bilbao has furnaces for separating the iron from the ore and for making steel. Spain is exceeded only by Italy as a producer of the curious but important metal known as mercury, or quicksilver. It is found around Almaden, south of the center of the country.

Fig. 447. Avenue in Lisbon, Portugal

Lisbon (Fig. 447) and Oporto are the chief seaports of Portugal. They export wine, cork, olive oil, and fruit.

Fig. 448. Loading iron ore at Bilbao. The cables carry the small cars from shore to ship

Madrid is the capital and the largest city of Spain, with a population of more than half a million. It is on the interior plateau, surrounded by a dry and barren region that is cold in winter and hot in summer. It has fine streets, magnificent palaces (Fig. 449), and a splendid gallery of pictures. It is a railway center and has some manufactures of porcelain, glass, and metal ware, and is especially important as the home of the rich and ruling classes.

458. Moors in Spain.—Many hundreds of years ago much of southern Spain was conquered and held for a long time by Moors, a Mohammedan people that came from Africa. Their chief city was Granada, on the north of the Sierra Nevada. Here is the Alhambra, a palace that is a wonderful example of Moorish skill in building. It is described in Washington Irving's book of that name.

Fig. 449. The Royal Palace, Madrid

459. Gibraltar.—Just inside the Strait of Gibraltar on the European side is a peninsula from which rises the great rocky height with steep sides, known as Gibraltar (Fig. 450). The rock, with its sloping base, covers an area of nearly two square miles, and is occupied by a population of about 25,000, many of whom are soldiers. The British people, who own Gibraltar, have made it a great fortress, one of the strongest in the world. Its guns command the entrance to the Mediterranean Sea, and some British warships are always to be found there. Between Gibraltar and Spain is a narrow strip of flat land that is unoccupied and is considered as neutral ground; that is, belonging to neither.

Fig. 450. The Rock of Gibraltar

Review.—1. How do the countries of the Iberian Peninsula compare with France in area and population? 2. Give a general description of the surface. 3. Why does most of the peninsula have little rain? 4. How does the coast line differ from that of Great Britain?

5. What are the foreign possessions of Spain? Of Portugal? 6. When did Portugal adopt its present form of government? 7. What is the condition of the Spanish and Portuguese peoples?

8. What kind of live stock is kept in Spain? 9. What is the principal grain? In what part of Spain is it most raised? 10. Where are oranges produced? Olives? Grapes?

11. Name and locate the chief commercial city of Spain. 12. What kind of manufacture is important there? 13. What seaport is the chief Spanish place for trade in oranges and onions? 14. Locate Bilbao and explain its importance. 15. Where is mercury mined? 16. Give some important facts about Madrid.

17. Name and locate the chief Moorish city of Spain. 18. What is the Alhambra?

Fig 451. Physical and Political
ITALY, RUMANIA
AND OTHER COUNTRIES OF
SOUTHERN EUROPE
Scale of Statute Miles
0 50 100 200
158 MILES TO ONE INCH
Capitals of Countries: ⊙
Principal Railroads:
ELEVATIONS IN FEET
OVER 5000
2000 TO 5000
1000 TO 2000
500 TO 1000
SEA LEVEL TO 500
Munich
Vienna
Prague
Budapest
Belgrade
Bucharest
Sofia
Constantinople
Athens
Rome
Naples
Venice
Milan
Trieste
Zurich
Basel
Geneva
Lemberg
Odessa
Smyrna
Salonica
Sarajevo
Trent
Florence
Palermo
Catania
Syracuse
Messina
Brindisi
Taranto
Genoa
Turin
Nice
Marseilles
Lyons
Strasbourg
Frankfort
Berlin
Dresden
Leipzig
Nuremberg
Stuttgart
Innsbruck
Salzburg
Graz
Klagenfurt
Ljubljana
Zagreb
Belgrade
Sarajevo
Banjaluka
Mostar
Spalato
Zara
Fiume
Pola
Ancona
Pescara
Foggia
Bari
Naples
Salerno
Gaeta
Civitavecchia
Leghorn
Pisa
Siena
Perugia
Ravenna
Bologna
Modena
Ferrara
Padua
Verona
Brescia
Como
Udine
Carrara
Lucca
Genoa
Gulf of Genoa
Gulf of Venice
Gulf of Taranto
Strait of Bonifacio
Strait of Messina
Strait of Otranto
Mt. Vesuvius
Mt. Etna
Mt. Olympus
Mt. Pindus
Mt. Taygetus
Mt. Parnassus
Mt. Parnassus
Mt. Ida
Mt. Ida
Mt. Ida

Fig. 452. A Swiss farmhouse in a valley of the Alps in summer

SWITZERLAND AND ITALY

	Area, Square Miles	Population	Capital
Switzerland .	15,956	3,880,000	Bern
Italy . . .	123,000	40,070,000	Rome

Map Study.—1. What countries border Switzerland? 2. What countries border Italy? 3. What large islands are a part of Italy? 4. Trace the course of the two chief rivers of Italy. 5. Locate Mt. Vesuvius and Mt. Etna. 6. Where is the island of Elba?

7. What is the capital of Switzerland? 8. Locate Zurich and Geneva. 9. Locate Milan and Turin, in Italy. 10. Locate Genoa and Venice. 11. Locate Florence, Leghorn, and Naples. 12. Where is the Strait of Messina? Locate Palermo.

SWITZERLAND

460. The Swiss Land.—Switzerland is only about one third as large as the state of New York. Although much of its surface is too high and rocky for farms and homes, the population is on the average about 240 people for every square mile. Here, as in Belgium and in England, many people are able to live in a small country because they are enterprising and produce a variety of manufactures which they sell to buy food and clothing.

Switzerland includes the central parts of the Alps, with hundreds of mountain peaks and hundreds of snow fields and glaciers (Fig. 452). In the lower valleys are vineyards, gardens, and fields of grain. On the lower

slopes of the mountains are the common trees with broad leaves such as beech and maple. Higher up are evergreen forests and grassy pastures, and above these are snow and rocks. Far above the tree limit, wild flowers of many colors bloom in summer on the stony slopes.

On the higher mountains the air is cold and the snows remain year after year. We call the lower limit of snow the *snow line*. On steep slopes the snows sometimes slide down in great masses, destroying trees and houses. Such a slide is an *avalanche*. When the snows pack together in the high valleys and change to ice, the ice may form a slowly moving glacier (Fig. 374).

Fig. 453. Lake of Geneva, showing city of Geneva in the background

Among the celebrated peaks of the Swiss Alps are the Matterhorn and the Jungfrau.

The northern part of Switzerland is a hilly plateau, 1000 to 2000 feet above the sea. Here are most of the farms and all the cities and largest towns. This region is sometimes called the Swiss lowland, because it is low as compared with the mountains. There are several large lakes. The most important are the Lake of Lucerne, Lake of Geneva (Fig. 453), and Lake of Constance. The Lake of Constance is on the boundary between Switzerland and Germany, and the Lake of Geneva is partly in France.

Switzerland is in the track of the westerly winds, and as it has so many high mountain ranges, much rain and snow fall, the fields are well watered, and the mountain snows are the source of great rivers (Sec. 383). Because the country is inland, it has a continental climate. Even among the snow-capped mountains, the valleys are warm in summer, and the whole country is cold in winter.

461. The Swiss People.—Life in the mountains tends to make people independent, strong, and home loving. Such a country is easier to defend than a flat and open region. For centuries the Swiss have been a brave and independent people. Whether William Tell ever really shot the apple from the head of his son, or not, the story gives a true idea of the people. They could not be easily subdued, and the greater powers of Europe have agreed to guarantee the independence of this little country.

The country is divided into a number of small states called *cantons*. These are united into a republic, at the head of which is a president, who is elected annually. Three principal languages are spoken. In the east and north, bordering Germany, most of the Swiss speak German. In the west, they speak French, and in the south, Italian.

On the farms and in the villages the Swiss build most of their houses of wood, because it is plentiful. Some of the houses are large and have several stories. They often include barn room also, the cattle and other stock, with the hay and grain, being under the same roof with the family. The roofs project far over the sides of the house, or *chalet*, giving it a homelike and graceful appearance (Fig. 452).

462. Swiss Industries.—The farmers raise the common grains and vegetables, and there are many vineyards in the warmer lowlands, and on the steep slopes around the Lake of Geneva. In the mountain valleys the chief industry is dairying. The thrifty farmers

Fig. 454. Swiss farm yard

save every bit of grass that they can gather for hay, and they drive the cattle to the upper pastures in the summer, somewhat as the Norwegians do (Sec. 436). The hay and wood from the higher fields and forests are dragged down the mountain side; and even young boys carry milk on their backs in large casks which are flat on the side that rests against the back.

The Swiss are skillful in making things in their homes. Many of them spend the winter days and evenings carving ornaments and trinkets from wood, which they sell to the next summer's tourists. In the cities the Swiss artisans are very skillful. They make silk, cotton, and other textiles, and also many million dollars' worth of embroidery each year. Much of this embroidery is sold in America. The Swiss also make jewelry and an immense number of watches. Many Americans have seen, or perhaps carry every day, a watch made in Geneva or Neuchatel. The Swiss make many kinds of cheese for home use and for export. Zurich (Fig. 455) is an important trade center and manufactures both silk and cotton goods.

Switzerland has no good coal, but it imports some, and also uses the water of its streams and waterfalls to furnish power. Because the Swiss are so thrifty and skillful, they have a foreign trade that amounts each year to much more than that of Spain, a country with a population nearly five times as large.

463. Travel in Switzerland.—Switzerland has been called the "playground of Europe." British people are fond of going there for their summer "holiday," — a word which they use to mean vacation. Thousands of Germans and Austrians also love to tramp among the mountains, and in the summer American tourists are seen in all the hotels and on all the roads. The Swiss mountaineers spend most of their summers keeping boarders, supplying vegetables, or acting as guides to visitors.

Alpine guides are daring but trustworthy, and with their aid many travelers climb the various summits of the Alps every summer. Sometimes these guides are taken to Asia or South America to help mountain climbers in those lands.

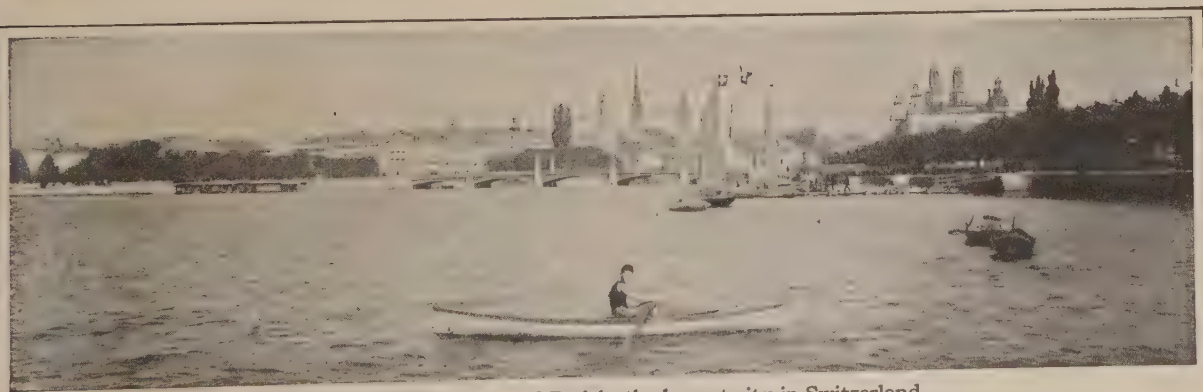

Fig. 455. Lake front of Zurich, the largest city in Switzerland

The roads of Switzerland are well built, and many of them are made by blasting the rock from the mountain side. Motor cars of the Postal Service carry mails and people over the roads. Switzerland has a good railroad system. The Swiss have built mountain railroads by which they carry passengers up steep slopes (Fig. 456), and even to the tops of several of the high peaks. Many people are thus enabled to have splendid views from mountain tops.

Fig. 456. Electric railway up the Jungfrau, an Alpine peak in Switzerland

464. Passes and Tunnels.—High valleys leading from one side of a mountain range to the other are known as *passes*. They are of far greater importance to the student of geography than are the most wonderful mountain peaks. This is true because of the influence of passes upon the location of routes of trade and travel. There are many passes in the Alps, and at the summits of a number of them were formerly built refuges, or hospices (Fig. 457), where devoted monks lived to help travelers in the cold and storms. The St. Bernard monks and their dogs still do this work.

Long tunnels have been made under some of the ranges, so that railroad trains can go through without climbing to the top; also the trains can pass through in winter as well as in summer. The Simplon tunnel is the longest of the great tunnels on railroads that connect Switzerland and Italy. It is about twelve miles long, and a train passes through it in about twenty minutes. In the tunnel trains are moved by electricity, so that the air is kept free from steam and smoke. It required great engineering skill to construct so long a tunnel. The work was carried on from both sides of the mountain range at the same time until the two parts met.

Review.—1. Give the size and population of Switzerland. 2. Define avalanche; the snow line. 3. What is a Swiss state called? What is the Swiss form of government? 4. What are the principal languages of the country? 5. What are the chief manufactures of Switzerland? 6. Define diligence, pass, hospice. 7. Describe the Simplon tunnel.

Fig. 457. Hospice at the Great St. Bernard Pass, on the southwestern border of Switzerland

Fig. 458. Bellagio, a town at the junction of the two southern arms of Lake Como

ITALY

465. Physical Geography.—The most northern parts of Italy are among the southern slopes and peaks of the Alps. Many rivers rise in the glaciers and snow fields, and flow down the slopes and across the plain into the river Po. On their way, some of them pass through beautiful lakes bordered by mountains (Fig. 458). These Italian Lakes are much visited for pleasure and recreation. Several railroads come through long tunnels or across passes and connect Italy with the rest of Europe.

The Po is the chief river of Italy, and it is bordered by fertile plains. It spreads the fine rock waste of the Alps over these plains in time of flood. It has built its delta out into the Adriatic Sea so rapidly that some towns that were on the sea border two thousand years ago are now several miles inland. Smaller tributaries flow into the Po from the Apennines on the south.

In the west, the main Alpine range bends to the south, and joins the Apennines. The Apennines extend the whole length of the peninsula of Italy, and in parts of the peninsula the mountains and hills occupy nearly its entire width. There are small lowlands on some parts of the shore and along the rivers, among which are the Arno and the Tiber. There are also small basins of flat and rich land high among the mountains. The largest river, next to the Po, is the Tiber, on which stands the city of Rome. The ancient Romans called it the " yellow Tiber," because it was muddy and discolored, as it is now, by the land waste brought from the mountains of the interior.

Much of the island of Sicily, which belongs to Italy, is mountainous, but owing to good soil and a warm climate, the small lowlands are very productive. The island of Sardinia, which also belongs to Italy, is very rugged and is unproductive except in minerals.

466. Climate.—Italy is as far north as our northern states, and yet it has a mild climate, and in the south is so warm that many tropical fruits and palms flourish. The basin of the Po is well protected from cold north winds

Fig. 459. View from Naples, showing part of the city and the bay, and Mt. Vesuvius in eruption

by the great Alpine mountains. The shores of the peninsula and the islands are washed by the warm Mediterranean waters. Winds from these waters blow inland, and except in the higher mountains there is rarely frost.

Most of the rainfall is in the winter, when it is not helpful to crops. In the summer the peninsula is in the belt of the northeast trade winds and has little rain. Hence irrigation is much used. In the Po basin there is more rain, but the plentiful water of the rivers also is employed to irrigate the fields, because in this way two or more crops can be raised in one season.

467. Volcanoes and Earthquakes.—A few miles from Naples is Vesuvius, a volcanic mountain (Fig. 459). Through the crater in the center and top of the mountain, melted rock or lava sometimes pours out and flows down the slopes. At times there are explosions in the crater, and clouds of dust and of larger fragments are hurled out. These darken the sky, and the stones and dust fall on the mountain slopes and build them up. Lavas and volcanic dust soon break up and make fertile soils, and people have gardens and vineyards and build large towns all around the foot of the mountain. Sometimes a town is partly or wholly destroyed and the people are compelled to leave, but they soon return and build homes again. In the year 79 A.D. a great eruption completely buried two cities, Pompeii and Herculaneum, and in time they were entirely forgotten. After many centuries Pompeii and a part of Herculaneum have been uncovered, the volcanic earth shoveled away, and the streets and many buildings, statues, and even pictures painted on the walls have been found well preserved (Fig. 460).

Fig. 460. House in Pompeii

Vesuvius is a small mountain, only about 4000 feet high, but Etna on the island of Sicily is about two miles high. At its foot are palms and orange trees, on its slopes are oaks and chestnuts, farther up are evergreen trees, and around the top are perpetual snows. Sometimes eruptions melt the snows, and send down streams of lava that endanger the towns and cities near the mountain.

In the Mediterranean, not far from Sicily, is Stromboli, an island volcano that is always sending out steam and other gases. In much of Italy are found volcanic rocks of former ages.

A valuable product of the volcanoes and of the volcanic rocks of Italy, especially in Sicily, is sulphur. Italy produces also about half of the world's quicksilver, as well as some zinc, lead, and iron.

In southern Italy earthquakes are common. In the year 1908 the large cities of Messina and Reggio were almost completely destroyed, and thousands of people were killed by the falling walls.

468. Italian Farming.—The plains of the Po furnish the largest area of good land in Italy. The soil is rich, level, and well watered. Wheat, corn, and rice are the principal Italian grains. The Italians grow large crops of wheat, and make much use of corn, which the poorer classes eat in the form of thick corn-meal mush. Much rice is grown in the Po Valley, where the fields can be easily leveled and the crops flooded when necessary. Italy is the leading European country in the growing of rice, although some is produced also in other countries of the Mediterranean slope, notably in Spain.

Mulberry trees are grown in many parts of Italy, especially on the plains of the Po; and Italy produces more raw silk than France, though it does not manufacture so much. Grapes are almost as abundant as in France, olives are widely raised (Fig. 461), and oranges and lemons are especially abundant in the southern end of the peninsula and in Sicily (Fig. 462). Nuts are extensively grown. About a million acres are covered with chestnut trees, and the people eat the nuts, boiled or roasted, in place of the potato. Nut meal is also used for making bread. Walnuts and hazelnuts are used at home and also exported. The Italians make large use of vegetables, which grow abundantly in their warm climate.

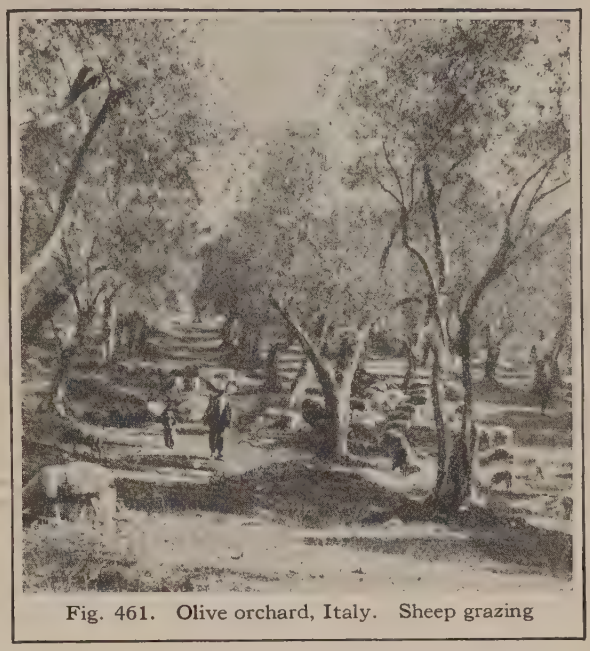

Fig. 461. Olive orchard, Italy. Sheep grazing

More than half of the Italian people are engaged in agriculture. Many of them do a great amount of hand work, turning the soil by hand and beating out wheat with a flail. For centuries they expended an enormous amount of time and labor in building walls and terracing mountain sides for grapes, oranges, and other fruits. White oxen, large and sleek, with long horns, are often seen at work on Italian farms, or drawing wagons in the streets of the cities (Fig. 464).

Fig. 462. Loading ships with lemons, at a wharf in Palermo

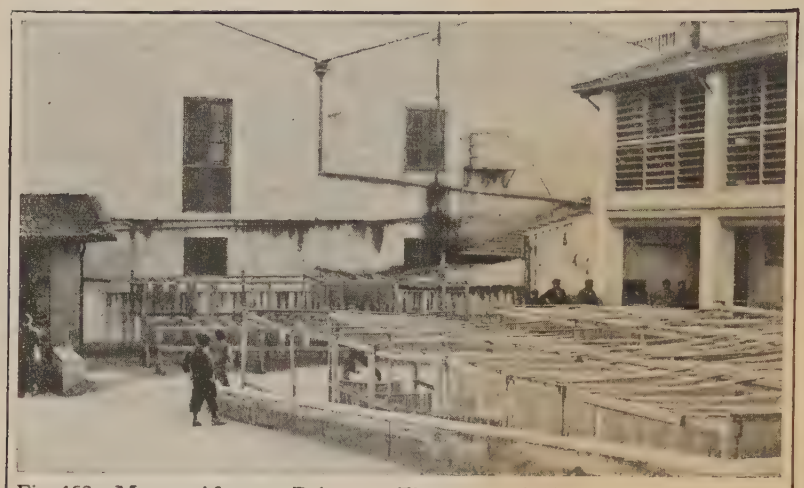

Fig. 463. Macaroni factory, Palermo. The macaroni is hung over frames to dry

469. Manufactures.—The Italians have always made certain things by simple processes, but have also begun to manufacture articles, like textiles and airplanes, that require much skill and the use of complicated machinery. Among the simple manufactures are macaroni and similar bread pastes, made from wheat flour (Fig. 463). The people have long been skillful in plaiting straw, and Florence has been a center for making and selling articles of straw for many hundred years. Thousands of women and children engage in this work. Italians also are expert jewelers, and skillful makers of gloves and lace.

All the salt and tobacco are manufactured and sold by the government. One cannot buy salt at a grocery, as we do in our country, because the government has its own stores for the sale of salt and tobacco, from which it gets a revenue.

Wine is made in immense quantities. Much is used at home, and much is exported. More olive oil is manufactured than in any other country, and the Italians use it in place of butter. The poorer people still use olive oil in their lamps, as all the people did for hundreds and even thousands of years.

Red coral is obtained on some parts of the coast by diving, or by the use of dragnets. It is used in Naples, Genoa, and other cities, in making beads and other ornaments. Some Italians, especially at Rome and Florence, are very skillful in fine metal work, and in making mosaics.

Fine marble is quarried in the mountains around Carrara (Fig. 464), and is exported to many countries and also wrought into building stones, statues, and many kinds of ornamental carved work. Superior work in glass is done near Venice and elsewhere.

Silk is manufactured in Milan and in other parts of the kingdom. Much raw cotton for manufacture is imported from the United States, and the industry is growing. Excellent automobiles are made at Turin.

470. History.—Several centuries before Christ the Greeks founded colonies and built cities in southern Italy. Long before the

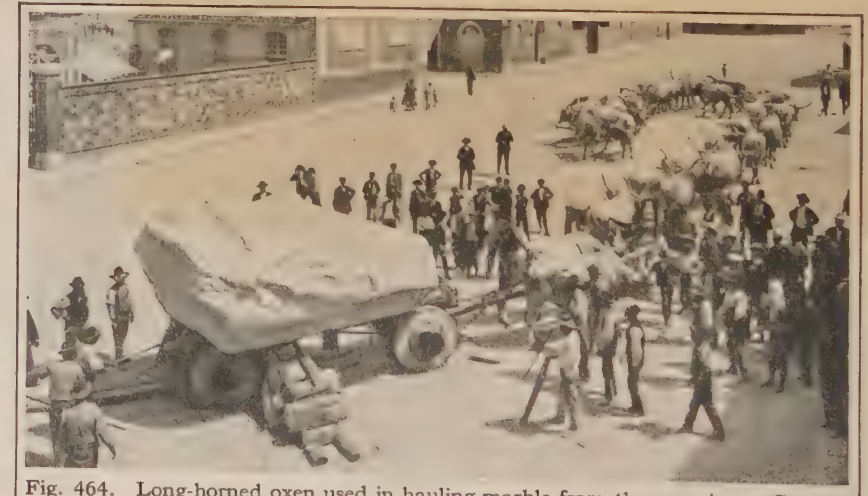

Fig. 464. Long-horned oxen used in hauling marble from the quarries at Carrara

Greeks came, however, there were people who had learned the arts of civilization. Later, in central Italy, the Roman dominion was founded, and at the time of Christ it embraced the civilized world of that period. Still later Italy was divided among various independent kingdoms and republics. Among the independent republics were Venice, Genoa, and Pisa, which sent their trading ships to all parts of the Mediterranean and even to the Black Sea.

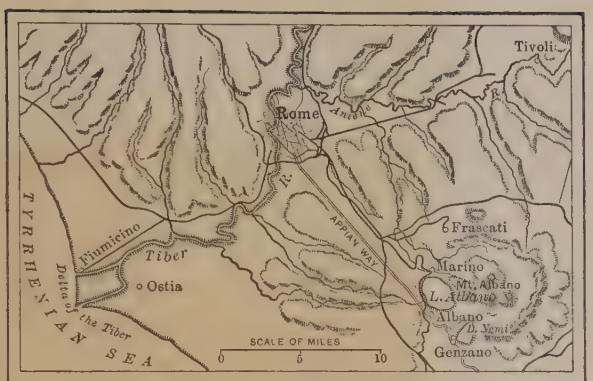

Fig. 465. Rome and vicinity

Italy remained divided until, about sixty years ago, the various parts joined together as the Kingdom of Italy. Some territory also was added after the World War. Italy has several colonies in Africa.

Within the peninsula of Italy is the little independent republic of San Marino, protected by Italy, as Andorra is held neutral by France and Spain. South of Sicily is Malta, a strongly fortified island owned by Great Britain.

471. Cities.—In Rome is the Forum, the market place of ancient Rome. Here may be seen the remains of temples and other public buildings. The rubbish of the old city has been removed from the Forum, and it is fenced in and opened to visitors. Near it are the ruins of the Colosseum, a vast amphitheater, seating thousands of people, who in ancient times gathered there to see contests of men and wild animals (Fig. 466). There are many beautiful churches of more modern times, of which the greatest is St. Peter's (Fig. 382). The Vatican adjoins St. Peter's church. It is a group of buildings in which the Pope resides and in which are galleries of painting and sculpture.

Milan is on the lowland of northern Italy, surrounded by rich land, and on the route southward from two of the great railroad tunnels through the Alps. It is the most important manufacturing and trading city of Italy, and contains one of the most beautiful cathedrals of Europe (Fig. 467). In this city, in the dining room of what was once a monastery, Leonardo da Vinci painted on the wall the well-known picture "The Last Supper." Turin also is in the Po Valley. It is joined to the rest of Europe through another of the great Alpine tunnels.

Fig. 466. Colosseum and Arch of Constantine, Rome

Fig. 467. The cathedral at Milan

Fig. 468. Harbor of Trieste

There are four important seaports in northern Italy,—Genoa, Venice, Trieste (Fig. 468), and Fiume. Genoa has a larger commerce than any other Italian coast city. Goods are landed here for Italy and for other countries. Venice is built on many low, flat islands, in a lagoon, or lake, that is separated from the Adriatic Sea by a sand beach. Canals take the place of streets, and boats, including steam and naphtha launches, are used instead of horses or trolley cars. In visiting a hotel or a gallery or house, one lands from a boat and goes into the building, which looks as if it stood in the water. Some of the boats, called gondolas, are propelled by oarsmen who stand as they row. There are many palaces, art galleries, and churches in Venice.

Another important seaport is Leghorn. Near Leghorn is Pisa, an ancient city in which the Leaning Tower still forms one of a group of remarkable buildings. Florence, in the interior of central Italy, is visited by thousands from all parts of the world, because its art galleries and churches contain many of the world's most notable paintings and other works of art.

Naples, the largest city of Italy, is an important seaport, and is visited by many tourists. Palermo is the chief center for the foreign trade of Sicily.

Review. 1. Why has the Po many large tributaries? 2. Where are the "Italian Lakes"? 3. How extensive are the Apennines? 4. What facts can you give about the Tiber?

5. Why has Italy a mild climate? 6. What is the cause of the small rainfall in summer? 7. Tell the story of Pompeii. 8. Name the chief agricultural products of Italy. 9. What is the mode of carrying on the trade in salt? 10. What celebrated places and buildings are in Rome? 11. What are the chief seaports of Italy?

Fig. 469. Transfers of territory in southern Europe

AUSTRIA, HUNGARY, AND CZECHO-SLOVAKIA

	Area, Sq. Mi.	Population	Capital
Austria . . .	30,700	6,131,000	Vienna
Hungary . .	36,000	7,841,000	Budapest
Czechoslovakia	54,700	13,596,000	Prague

Map Study (Figs. 371, 451).—1. Locate Vienna with relation to the Alps and the Carpathians. 2. What river drains nearly all of Bohemia? 3. To what extent is Bohemia bordered by mountains? 4. What city of Czechoslovakia is on the Danube? 5. What countries does the Danube cross? 6. What countries have the Danube as a part of their boundaries? 7. Name two rivers which drain the plains of Hungary. 8. In what respect do the three countries here studied resemble Switzerland? 9. Locate Karlsbad; Innsbruck; Budapest.

472. History.—The former dual monarchy of Austria-Hungary, consisting of two monarchies under the same ruler, extended from the eastern boundary of Germany to the Iron Gate and the Transylvanian Alps; and from the plains north of the Carpathians to the Adriatic Sea. After the World War Austria, Hungary, and Czechoslovakia became independent countries (Fig. 469), and large sections formerly subject to Austria-Hungary became parts of Poland, Rumania, Yugoslavia, and Italy. The new boundaries were determined for the most part on the basis of racial kinship.

473. Austria.—Austria is now reduced to a belt of territory along the Danube, and a part of the eastern Alps. The provinces of Upper and Lower Austria extend along both sides of the Danube from Bavaria to a point eastward from Vienna. The Alpine region includes the Tyrol and other provinces. Trentino in the southern Alps, drained by a branch of the Po River, becomes a part of Italy, as do Trieste and the region bordering the head of the Adriatic Sea.

Fig. 470. Street in Vienna. Billboards like the one shown are common in European cities

The lowlands are not extensive and they lie mainly along the Danube. The Alpine region has many high peaks, deep and narrow valleys, snow fields and glaciers. Innsbruck is a city in the Austrian Alps, much frequented by tourists. From Innsbruck a railway leads into Italy by the Brenner Pass, one of the ancient gateways across the Alps.

The mineral wealth of Austria is not great. Iron is found, especially at Eisenerz in the Alps, where a mountain about a mile high contains much ore. Some coal is mined. The greatest mineral resources, as well as the best agricultural lands of the former Austrian Empire, belong now to other countries.

Austria is now smaller than Pennsylvania in area and population. Most of the people are of German blood and speak the German language. The majority are of the Roman Catholic faith.

At the point where the Danube passes between the east end of the Alps and the west end of the Carpathians stands Vienna, the capital, formerly the capital of the empire (Fig. 470). It is a very large city, but its trade and industries were cut down by the loss of its tributary territory.

West of Austria is the independent principality of Liechtenstein, which has a population of about 10,000.

474. **Hungary.**—Like Austria, Hungary, the other member of the former dual monarchy, has lost large areas, in the north, the east, and the south. The old Hungary included 125,000 square miles of territory; it was larger and had a greater population than our Middle Atlantic States. The present Hungary, like Austria, is smaller than Pennsylvania. Most of its people are true Hungarians or Magyars, descendants of Asiatic people who came to Hungary many centuries ago.

Hungary consists mainly of two plains. The greater plain lies along the Danube in its southward course below Budapest, and along the Tisza, a large tributary of the Danube, which flows from the Carpathians southward and enters the main stream above Belgrade. The smaller plain borders the Danube between Budapest and Vienna.

There is some coal, but the other mineral resources are small. The principal industries are stock raising and agriculture. Wheat and maize are extensively raised on the great central plains, and grapes and tobacco are products of some importance.

The manufactures reflect the agricultural character of the country. Flour milling is highly developed at Budapest, and other industries are brewing and distilling, tobacco curing, the making of beet sugar, and the manufacture of agricultural implements.

Budapest, the capital, is a large and well-built city. Its two parts, Buda and Pest, stand on opposite sides of the Danube (Fig. 471).

Fig. 471. Airplane view of the Hungarian Parliament House at Budapest, overlooking the Danube River

475. **Czechoslovakia.**—Czechoslovakia is the land of the Czechs and Slovaks, two closely related branches of the Slavic race. Though long subject to Austria-Hungary, they preserved their national traditions, held to their own forms of speech, and developed their literature.

The country embraces Bohemia, Moravia, and Austrian Silesia, all former provinces of Austria and inhabited mainly by Czechs. It also includes a large section of northern Hungary, on the slopes of the Carpathians, occupied by the Slovaks. Between Vienna and Budapest the new country extends southward, taking in the former Hungarian city of Pressburg and a section of the Danube plains. Altogether, Czechoslovakia is nearly as large as Austria and Hungary together.

Bohemia, the western part of Czechoslovakia, is bordered by mountainous and hilly uplands. A mountain range, under various names, bends around the province on the west, north, and northeast, while on the southeast a hilly region leads into the province of Moravia. The river Elbe rises in Bohemia and passes through the mountain range on the north, afterwards crossing Saxony and Prussia. Thus Prague and other cities of Bohemia communicate by water as well as by rail with Dresden and Hamburg in Germany.

Moravia lies between Bohemia and the Slovak section of the Carpathians. From the watershed in Moravia the river Oder

flows northward through Germany, and a smaller river flows south to the Danube. Along these valleys is the "Moravian Gateway," a notable route of traffic leading from the Adriatic Sea and the Danube to the Baltic Sea, and much used in ancient as well as in modern times.

The new nation has chosen a republican form of government, and its capital is Prague, the ancient capital of Bohemia. It is a splendid city on a branch of the river Elbe.

Fig. 472. Steel mills in Czechoslovakia

476. Industries of Czechoslovakia.—Bohemia has long been the principal manufacturing district of Austria-Hungary. It has abundant coal to supply power for its iron and textile industries. The streams flowing from the forested upland borders supply much water power. Here is made the celebrated Bohemian glass, and in this province also are the breweries of Pilsen and other places for which the Bohemian farms furnish the necessary hops and barley. In Bohemia are health resorts such as Karlsbad and Marienbad, with mineral springs and hot baths to which people of many countries go for medical treatment. There is kaolin for porcelain, and paper mills utilize the wood from the forests. Silver, radium, and graphite, as well as iron and abundant coal, are found in various sections of the country. Iron and steel are important products of western Czechoslovakia (Fig. 472). The textile industries, including the manufacture of cotton, woolen, and linens, are carried on both in Bohemia and in Moravia.

In the agricultural regions of the country the variety of products is large. Cereals, potatoes, sugar beets, tobacco, hops, and fruits are raised.

477. The Danube River.—The Danube and the Rhine are the chief international rivers of Europe. The Rhine furnishes a trade route for Switzerland, Germany, France, and the Netherlands. The Danube crosses Germany, Austria, Hungary, Yugoslavia, and Rumania, and for long distances forms the southern border of Czechoslovakia and the northern border of Bulgaria. It flows between the Alps and Carpathians at Vienna, and between the Transylvanian Alps and the Balkan Mountains at the Iron Gate. As the waters connecting the Black Sea and the Mediterranean have been internationalized, the Danube has become one of the most important routes of interior navigation in the world.

Review.—1. What changes have taken place in the former Austria-Hungary? 2. Name a tourist center and an important pass in the Austrian Alps. 3. What changes have taken place in the area and population of Hungary? 4. What are the manufactures of Hungary? 5. What parts of the former monarchy of Austria-Hungary are included in Czechoslovakia? 6. Describe the boundaries and drainage of Bohemia. 7. What are the manufactures of Bohemia? 8. For what countries does the Danube afford a trade route? 9. What is the Iron Gate?

THE BALKAN COUNTRIES

	Area, Sq. Mi.	Population	Capital
Yugoslavia	95,000	12,017,000	Belgrade
Rumania	116,000	17,393,000	Bucharest
Bulgaria	40,000	4,910,000	Sofia
Albania	11,000	832,000	Tirana
Greece	42,000	4,932,000	Athens
Turkey in Eur.	10,000	1,800,000	

Map Study (Figs. 371, 451).—1. Bound Bulgaria; Greece; Rumania. 2. Locate the capital of Rumania; of Yugoslavia. 3. Locate the Bosporus; the Sea of Marmora; the Dardanelles. 4. Locate Athens; Salonica; Constantinople; Sofia; Belgrade. 5. Where, on the Danube, is the Iron Gate? 6. State an important difference between the Balkan and the Italian coast lines of the Adriatic Sea. 7. What is the character of the surface and of the shore line of Greece? 8. Compare Yugoslavia, in size, with Rumania; with Czechoslovakia; with Bulgaria.

478. Physical Features.—The Balkan Peninsula is sometimes likened to a bridge joining Europe to Asia. It faces Asia across three seas — the Black Sea, the Sea of Marmora, and the Aegean — and is bordered also by the Adriatic Sea and the Mediterranean. Its northern boundary is vague, but may be described as extending from Fiume on the northern Adriatic, eastward along the Save and Danube rivers, to the Black Sea.

The land is mountainous, but among the mountains there are many beautiful valleys and old lake basins. In the west are the Dinaric Alps. This range of highlands continues the folds of the Alps southeastward into Greece. The Balkan Mountains are in the northern and eastern part of the peninsula, in Bulgaria and eastern Yugoslavia. Extending south and east from the Iron Gate (Sec. 383), they may be regarded as a continuation of the great Carpathian range.

479. History of the Balkan Region.—This part of Europe has been for thousands of years in close relation to Asia. Across the narrow waters that join the Black and Aegean seas, men have gone for trade, for settlement, and for war and conquest. The land route from southern Europe to southwestern Asia leads through the Balkans, and a trunk railroad connects Constantinople with the Danube trade route at Belgrade. A branch line joins Nish and Salonica.

The whole Balkan region fell under the control of the Turks several hundred years ago, but the cruelty of their rule caused one group of people after another to rebel and set up independent governments. A further blow to the Turkish power in Europe came in a war with the adjacent countries of the peninsula in 1912–1913. The Turks were then compelled to give up about five sixths of their European possessions, retaining only a small area in the east. The greater part of the conquered territory was divided among Greece, Serbia, Montenegro, and Bulgaria, the four kingdoms that had carried on the war. A small region on the Adriatic Sea was given an independent existence as Albania.

As a result of the World War, the kingdom of Yugoslavia was formed, including Serbia, Montenegro, and several southern provinces of the former Austria-Hungary. Rumania was doubled in size, and Greece gained territory from Bulgaria and from Turkey.

480. Yugoslavia.—This is the kingdom of Serbs, Croats, and Slovenes, and is some-

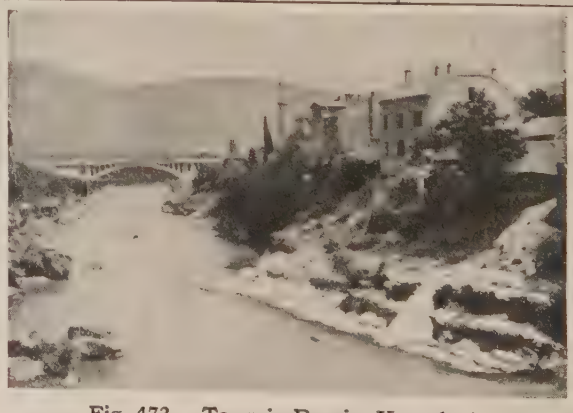

Fig. 473. Town in Bosnia, Yugoslavia

times referred to as the greater Serbia. These three peoples are, as the name Yugoslavia indicates, Slavs of the southern or Balkan region, thus contrasting with the northern Slavs of Czechoslovakia, Poland, and Russia. The Serbs live in the eastern part of the country, not only in the old Serbia but also in Montenegro, Bosnia, and other provinces. The Croats and Slovenes, in Croatia and other western provinces, are closely akin to the Serbs in blood and in language.

The northern boundaries of Yugoslavia are mainly on the plains north of the Drave and Danube rivers. The country has a considerable section of the Dalmatian coastline between Albania and the upper Adriatic region of Italy. Most of the ports on the Adriatic, however, are difficult of access from the interior, because the rugged ridges of the Dinaric range everywhere follow the coast line. The railroads of the peninsula already referred to furnish overland trade routes through the Morava and Vardar valleys to Constantinople and Salonica. Other railroads lead across the Dinaric Alps to the port of Fiume.

Much of Yugoslavia is a tangle of mountains and valleys, and has no natural center from which all parts are easily reached. Its material resources have remained largely undeveloped because of the oppression to which the people have been subjected under the rule of both Turkey and Austria-Hungary.

The people are mainly devoted to agriculture, for which the soils and climate of the mountain valleys are well suited. Wheat and corn are important crops, and there is much fruit, especially grapes and plums. Cereals, prunes, prune marmalade, timber, and swine are important exports.

Coal and copper are important mineral products, and the mountain regions of the greater Serbia will, no doubt, when explored and developed, yield a large output of mineral wealth. Carpet weaving and flour milling are the chief manufacturing industries.

Fig. 474. Threshing wheat in Rumania

481. Rumania.—The kingdom of Rumania is usually called one of the Balkan countries, although only a small part of it, in the southeast, is in the Balkan Peninsula. Prior to the World War Rumania was a little larger than the state of Pennsylvania and had about an equal number of people. Other millions of Rumanians, however, were subjects of Austria-Hungary and Russia, and after the war the adjoining regions, where Rumanians predominate, were added to Rumania. From the tables on pages 321, 324, compare Rumania in size and population with other countries of southern Europe.

The old Rumania was mainly a plain on the north bank of the Danube, rising in the north to the crest of the Carpathians, there known as the Transylvanian Alps. This plain bordered in the east on the Black Sea and on Russia, from which it was separated by the Pruth River. By the new arrangement Rumania acquires the old Hungarian mountain region of Transylvania and reaches westward into the Hungarian plain. It also acquires the Russian province of Bessarabia, and Bukowina, a former province of Austria lying on the northeastern slope of the Carpathians.

The Rumanians, although partly Slav by race, claim to be descendants of ancient

Fig. 475. Market day in Sofia

Roman colonists; they speak a language derived largely from Latin.

The Rumanian plain has hot summers and cold winters, with a rainfall of about 20 inches. It is therefore continental in climate, like Russia. There are extensive forests, especially in the Bukowina and Transylvanian highlands. They include oak, beech, plane, and ash. Lignite is mined, some salt is produced, and much petroleum is exported. Glass making is an industry of importance, and in Bukowina and Transylvania there are paper and leather industries.

The plains of Rumania are very productive and, as in Hungary and Russia, the crops of wheat, corn, and other grains are large. Petroleum and various grains are important exports to Great Britain. Galatz on the Danube is a wheat-exporting city. Bucharest is the capital and largest city. Transportation is afforded by extensive railroad lines and by means of ships on the Danube River and on the Black Sea.

482. **Bulgaria.**—Before 1908 Bulgaria was a principality tributary to Turkey. In that year an independent kingdom of Bulgaria was established. Sofia, the capital (Fig. 475), has about 150,000 inhabitants. The country is nearly as large as Ohio. It has ports on the Black Sea, and is crossed by the trunk railroad leading to Constantinople.

The population includes, in addition to the Bulgarians, many Turks, Rumanians, Greeks, and Gypsies. Such a mixture of races is common in all the Balkan countries, and in connection with Turkish misrule has been the cause of much disorder. Education has been generally neglected, and modern industry has made little progress.

Three fourths of the people in Bulgaria till the soil, and live on farms of a few acres each. Wheat and corn are the leading grains. Tobacco, silk, and sugar beets are produced. The climate south of the Balkan range is mild, and favors the growth of rice and especially of roses, used in making the perfume attar of roses. Coal and iron are mined, and there are some manufactures of cotton and wool.

483. **Albania.**—The new country of Albania, formed from Turkish territory in 1912, has been the home of the Albanian people for many centuries. The people are divided in religious faith, some being Mohammedans and some Christians. Tirana is the capital. There is little or no manufacturing, agriculture is of the most primitive kind, and there are no railroads, though certain lines are projected. Valuable mineral deposits exist, but are not worked.

484. **Greece.**—The republic of Greece is larger than the state of Ohio, but has a smaller population.

The ancient Greeks were the leaders of the world in poetry, philosophy, science, architecture, and sculpture. They founded colonies in other Mediterranean lands, and taught the ruder Roman people much that made them great.

Athens, an ancient city, is the capital of modern Greece. It still possesses the ruins of the Parthenon (Fig. 476), one of the most beautiful of ancient temples. The city is several miles inland, and its port is Piraeus. Salonica, the Thessalonica of the Bible, is a large and important seaport; it was acquired as a result of the recent Balkan wars. After

the World War, Greece gained further territory in the northeast. Elementary education is compulsory, and the University of Athens enrolls several thousand students.

Greece is a land of mountains and valleys, much broken by inlets of the sea. The Isthmus of Corinth is but a few miles wide, and a ship canal has been cut across this neck of land.

Only about one fifth of the land surface is capable of cultivation. The climate is dry, and in some districts irrigation is necessary. The small dried grapes known as "currants" are the leading product and the chief export. Olives are next in importance. Figs and tobacco are also raised, and several million bushels of wheat; but much wheat is imported.

The country has a variety of metals, including iron, copper, zinc, and lead.

Greeks own much shipping in the Mediterranean Sea and control a line of steamships to New York.

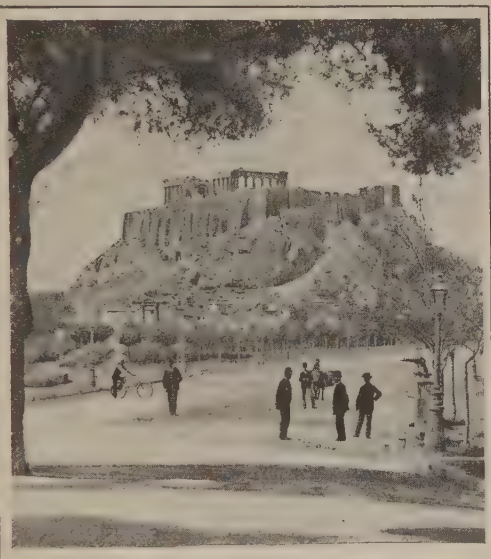

Fig. 476. The Acropolis, Athens

485. Turkey.—European Turkey is but a small remnant of the great territory which the Turks once controlled in Europe. Most of the territory lost was lost because of the harsh treatment of the native people. The former rule of the Sultans has been abolished and Turkey is now a republic. The capital of Turkey is Angora in Asia Minor.

Constantinople, on the Bosporus, is by far the largest city of the Balkan Peninsula, and is one of the most ancient and celebrated cities of Europe (Fig. 451). Here the Greeks founded a city 700 years before Christ, and called it Byzantium. The name was changed to Constantinople by the Roman emperor Constantine, and he made it the capital of the Roman Empire. Its best-known buildings are the great Mohammedan mosques, or places of worship (Fig. 477), and the palace of the Sultans, the former rulers of the country. The population includes people of many races.

Turkish industries and trade are in a backward condition. Large numbers of ships enter and clear from the harbor of Constantinople each year, but their trade is largely with ports situated on the Black Sea. There are large fisheries in the Bosporus.

Fig. 477. Mosque of Suleiman, Constantinople

Review.—1. What Balkan countries have the Danube as part of their boundaries? 2. What are the chief products of Yugoslavia? 3. What are the industries of Rumania? 4. Tell the recent history of Bulgaria. 5. In what did the ancient Greeks excel? 6. Give an account of the Greek population and industries at the present time. 7. Give some facts about the history of Constantinople. 8. Why is its situation important?

Hammerfest
North Cape
Tromsö
Vardo
Varanger Fiord
Ekaterina Har.
NOVA ZEMBLA
VAIGACH I.
ARCTIC OCEAN
ATLANTIC OCEAN
Arctic Circle
LOFOTEN IS.
Narvik
Kolari
Murmansk
KOLGUEF I.
Kanin Peninsula
Gulf of Chesh
Kola Peninsula
Obdorsk
Gulf of Ob
Christiansund
Trondhjem
Lulea
Torneå
Uleaborg
Umeå
Mezen
Surgut
Ob R.
Bergen
Sundsvall
Söderhamn
Gefle
Gulf of Bothnia
Archangel
Pechora R.
SYRJAN
SIBERIA
Stavanger
Christiansand
The Naze
Oslo (Christiania)
Vasa
Tammerfors
Dvina R.
Irtysh R.
Skagerrack
NORTH SEA
Abo
Helsingfors
Hango
Stockholm
Petrezavodsk
L. Onega
L. Ladoga
Ustyug Veliki
Kotlas
FOREST REGION
Solikamsk
Tobolsk
Tiumen
Irbit
Goteborg
Kronstadt
Leningrad (Petrograd)
ESTHONIA
Narva
Tartu
Reval
Vologda
Vyatka
Perm
Ekaterinburg
Omsk
Petropavlovsk
Copenhagen
Malmo
BORNHOLM
Baltic Sea
Riga
LATVIA
Novgorod
Yaroslave
Ivanovo Voznesensk
Nizhni Novgorod
Kazan
Cheliabinsk
Troitsk
Zlatoust
Ufa
Hamburg
Bremen
Berlin
LITHUANIA
Kovno
Daugavpils
Vitebsk
Borodino
Moscow
Smolensk
Kaluga
Tver
Ryazan
Tula
Penza
Samara
Orenburg
Orsk
Turgai
Lodz
Warsaw
Vilna
Minsk
Grodno
Bialystok
Pinsk
Brest Litovsk
Gomel
Orel
Kozlof
Tambof
Petrovsk
Saratof
Uralsk
Kalmikof
Lublin
Krakow
Vienna
Zhitomir
Lemberg
Kamenets Podolsk
Berdichef
Kief
Poltava
Kharkof
Kursk
Voronezh
Kremenchug
Ekaterinoslaf
Elizavetgrad
Krivo Rog
Nikolaief
Taganrog
Berdiansk
Kherson
Odessa
Rostof
Tsaritsyn
Astrakhan
Kalmuk Steppe
Kirghiz Steppe
Aral Sea
Lake Aral
Perovsk
Kazalinsk
Syr R.
Ural R.
Volga R.
Don R.
Sea of Azof
Crimea
Kertch
Sebastopol (Achair)
Krassnodar
Kuban R.
Vladikavkaz
Tiflis
Batum
Caspian Sea
Ust-Urt Plateau
Amu R.
Bucharest
Galatz
Danube R.
Varna
BULGARIA
RUMANIA
Black Sea
Kerch Strait
Dnieper R.
Dniester R.
Pripet R.
Berezina R.
Western Dvina R.
Niemen R.
Vistula R.
Oder R.
Elbe R.
Rhine R.
Danube R.
Prague
Breslau
Leipzig
Dresden
Königsberg
Danzig
Libau
Reval
Gulf of Finland
Gulf of Riga
Aland Is.
Dago
Oesel
Gotland
Hanko
Helsingfors
Abo
Viborg
Kotka
Kronstadt
Narva
Tartu
Pernau
Riga
Libau
Daugavpils
Kovno
Vilna
Grodno
Minsk
Bialystok
Pinsk
Brest Litovsk
Lublin
Krakow
Vienna
Zhitomir
Lemberg
Kamenets Podolsk
Berdichef
Kief
Poltava
Kharkof
Kremenchug
Ekaterinoslaf
Elizavetgrad
Krivo Rog
Nikolaief
Taganrog
Berdiansk
Kherson
Odessa
Rostof
Tsaritsyn
Astrakhan
Kalmikof
Uralsk
Orsk
Orenburg
Samara
Penza
Saratof
Petrovsk
Tambof
Kozlof
Kursk
Voronezh
Orel
Gomel
Tula
Ryazan
Moscow
Borodino
Vitebsk
Smolensk
Kaluga
Tver
Yaroslave
Ivanovo Voznesensk
Nizhni Novgorod
Kazan
Vologda
Novgorod
Petrezavodsk
L. Onega
L. Ladoga
Ustyug Veliki
Kotlas
Solikamsk
Perm
Vyatka
Ekaterinburg
Cheliabinsk
Troitsk
Zlatoust
Ufa
Tobolsk
Tiumen
Irbit
Omsk
Petropavlovsk
Irtysh R.
Ob R.
Surgut
Obdorsk
Gulf of Ob
Mezen
Archangel
Pechora R.
Dvina R.
Onega R.
Kem
Gulf of Onega
White Sea
Kola Peninsula
Kanin Peninsula
Gulf of Chesh
KOLGUEF I.
NOVA ZEMBLA
VAIGACH I.
Varanger Fiord
Ekaterina Har.
Vardo
Tromsö
Narvik
Kolari
Lulea
Torneå
Uleaborg
Umeå
Trondhjem
Bergen
Christiansund
Stavanger
Christiansand
The Naze
Oslo (Christiania)
Sundsvall
Söderhamn
Gefle
Gulf of Bothnia
Vasa
Tammerfors
Aland Is.
Abo
Helsingfors
Hango
Stockholm
Skagerrack
NORTH SEA
Goteborg
Copenhagen
Malmo
BORNHOLM
Baltic Sea
Hamburg
Bremen
Berlin
Leipzig
Dresden
Breslau
Prague
Vienna
Danube R.
Dniester R.
Pripet R.
Berezina R.
Western Dvina R.
Niemen R.
Vistula R.
Oder R.
Elbe R.
Rhine R.
Lodz
Warsaw
Lublin
Krakow
Brest Litovsk
Pinsk
Bialystok
Grodno
Minsk
Vilna
Königsberg
Danzig
Libau
Reval
Gulf of Finland
Gulf of Riga
Aland Is.
Dago
Oesel
Gotland
Hanko
Helsingfors
Abo
Viborg
Kotka
Kronstadt
Narva
Tartu
Pernau
Riga

Fig. 479. The Kremlin, a walled area in the center of Moscow, containing many public buildings

EASTERN EUROPE

	Area, Sq. Mi.	Population	Capital
Russia, etc. .	1,716,500	93,782,000	Moscow
Finland . .	130,000	3,367,000	Helsingfors

Map Study.—1. How many degrees of longitude are covered by Russia? How many degrees of latitude? 2. What countries border Russia on the west? 3. What ocean and what seas and gulfs are on the boundary?

4. Using the scale of miles, determine the width of the Caspian Sea. 5. What long river flows into it? 6. What city is at the mouth of this river? 7. What river flows into the Sea of Azof? 8. What large river flows into the Black Sea?

9. Locate Moscow, Nizhni Novgorod, Leningrad. 10. Name the chief seaport on the Black Sea. 11. Where is the peninsula called Crimea?

12. What part of Russia has many lakes? 13. Compare the latitude of Russia with that of the United States; with that of Canada. 14. How do most of the rivers flow with reference to the center of the country?

15. What waters border Finland? 16. Locate the capital of Finland.

Fig. 480. Boat on the Dnieper River at Smolensk

486. Physical Geography.—East of Germany, the central plain of Europe widens and embraces the eastern half of the continent. The greater part of this eastern plain belongs to Russia. The highest land is in the center, where the rivers rise. But even this region is flat and less than 1100 feet above the sea.

The rivers are long and descend very slowly to the sea. For this reason Russia has many thousands of miles of interior navigation (Fig. 480). The Volga, which flows into the Caspian Sea, is one of the world's greatest rivers. In its lower course it flows through a large region that is below the level of the ocean.

The Ural Mountains are on the east border, but they are so low and have such gentle slopes that they do not form a real barrier. No mountains are visible in crossing by rail from Russia to Siberia. Some geographers consider the Caucasus Mountains as part of the southern boundary of Europe. Others place that boundary between the Caspian Sea and the Sea of Azof, at the valley of the Manich, as shown in this book (Figs. 371, 478).

Fig. 481. Sledge and ponies in a North Russian village

Although the Caspian Sea receives the water of the longest river of Europe, the region is so dry that few other streams enter the sea, and its surface is kept by evaporation 85 feet below the level of the ocean. It has no outlet, and its waters are salt like those of Great Salt Lake. The Black Sea receives large rivers, and is connected with the Mediterranean Sea. Its waters are brackish.

As in Scandinavia and north Germany, so in Finland and in northern and western Russia, an ancient ice sheet swept over the surface. By this agency thousands of lakes were formed.

487. **Climate and Vegetation.**—The range of latitude is so great that eastern Europe is cold in the north, temperate in the middle, and warm-temperate in the south. The climate is continental, for the land is far from the Atlantic, and the westerly winds do not give even temperatures as they do in western Europe. The winters are cold, and the summers are hot. The rainfall varies greatly in different parts of Russia; it is moderate in the central and western parts, and lighter — less than 20 inches — in the north, east, and south. But in most of Russia there is usually enough moisture for good crops because the rains fall mainly in the summer.

In the north is a belt of tundra or Arctic plains. Farther south is an extensive forest belt, of birch, beech, oak, fir, and pine. This belt is so extensive that lumber interests in Russia and Finland are large.

In central and southern Russia is the fertile region of the so-called "black earth." This is a deep and rich soil, resembling that of our prairies, and especially suitable for raising wheat and other grains. Here the population is dense. In the southeast, around the Caspian Sea, is the steppe region, where the land is too dry for farming; some parts of it are below sea level. The population of this region is sparse.

488. **Russia.**—Before the World War European Russia had about 140,000,000 people. The Russian Empire included also Siberia, Turkestan, Caucasus, and some other regions in Asia; the total population was 175,000,000 and the area larger than that of the mainland of North America. As a result of the war the monarchical government was overthrown and the western parts of the old empire became independent countries.

The greater part of Russia fell under the control of extreme radicals, who framed for it a government by soviets, or councils of union workmen. It is the largest country of Europe. Most of its inhabitants are Great Russians, the most numerous people of the Slavic group. Many parts of Russia occupied by other peoples — such as Ukraine, White Russia, Karelia, etc. (Fig. 478) — were given local governments of their own, under soviet control.

Russia is a backward country, and until about sixty years ago many of its peasants were serfs. The roads and the schools are poor. The peasants' ways of living are very simple and rude (Figs. 481, 482).

The prevailing worship is in the forms of the Orthodox Church.

Fig. 482. Russian farmers in a sugar beet field

489. Russian Agriculture.— Russia is primarily an agricultural country and most of its people are engaged in farming.

During the long Russian winters there is not much work on the farms, and some of the land owners live in the cities or carry on industries and trade. Farm produce is often marketed by means of sledges which can be easily drawn over the snow-covered ground.

Wheat is grown in the "black-earth" region of Russia. Much rye is raised, and the peasants use rye bread. Barley, oats, and flax also are leading crops. The flax is grown both for fiber and for making linseed oil. Hemp, another and taller fiber plant, is an important product. Potatoes and sugar beets are the most common vegetables.

The farmers generally use primitive methods and rude tools, but in many places modern agricultural tools and machines have been introduced. The modern implements have come partly from the United States.

490. Mines and Manufactures.— Iron and coal are found in several parts of Russia and considerable iron is manufactured. In the Ural Mountains many metals are mined, including the very hard and valuable metal, platinum, of which Russia furnishes an important part of the world's supply.

Fig. 483. St. Basil's Church, Moscow

The largest manufacturing center of Russia is in and near Moscow. The use of manufacturing machinery is very limited, and, as in other backward countries, many things are still made by hand. But in Moscow and Leningrad, and to a lesser extent elsewhere, machinery has been introduced, and before the World War the textile industries had reached a flourishing condition. One of the largest of these was cotton manufacturing, for which Russia imported much raw cotton from our southern states. The war and ensuing difficulties brought most of the Russian factories to a standstill; but the country has so many people and can supply so much cheap labor that manufactures are likely to increase.

491. Cities and Routes of Trade.—Moscow, the capital of Russia, is in the central part of the country and is the chief railroad center. Railroads lead north to Archangel, northwest to Leningrad and thence to Murmansk, west to Warsaw and Berlin, and south to Odessa and Sebastopol. Another line extends eastward into Asia, and crosses Siberia to Vladivostok on the Pacific. Not far from Moscow are ports on the Volga, which is navigable to its mouth. The Orthodox Church,

Fig. 484. Shipping on the Neva River, in Leningrad

which is the national church of Russia, has its principal seat in Moscow, and this city is known as the "holy city" of the empire (Figs. 479, 483). It has many palaces and a large university.

Leningrad, formerly named St. Petersburg, then Petrograd, is at the mouth of a short river called the Neva (Fig. 484). It was the capital of the old Russian Empire. It is second only to Moscow as a manufacturing center. Leningrad and other ports on the Baltic are closed by ice for many weeks of the winter; for the shallow, brackish water (Sec. 382) is easily frozen.

Nizhni Novgorod, east of Moscow, has every year the greatest of the Russian fairs. These are not, as in our country, places for showing fine products for which prizes may be awarded, but places where, for centuries, people have come from all parts of the country bringing their goods for sale. We should call them markets. Astrakhan is a center for fisheries and a starting point for Persian trade. Archangel receives and sends out the natural products of the colder parts of Russia, lumber, flax, and some kinds of grain. It is icebound for several months of each year. Murmansk, the terminus of a Russian railroad built during the World War, is a port open all the year.

Kief, an ancient city on the Dnieper River, is a center for linen and woolen manufactures and for the wine trade. Odessa, on the Black Sea, is the chief southern seaport. It receives much of the Russian wheat crop and exports both grain and flour. Taganrog, on the Sea of Azof, also ships much wheat.

Although Russia has several seaports it is not well situated for trade by ocean ships. The open Arctic Ocean at Murmansk is reached only by a long railroad through barren country. Both the White and Baltic seas are closed by ice for a long time during the winter months. The Black Sea ports can be reached only by way of narrow straits

Fig. 485. Bridge across the Volga, Nizhni Novgorod

Fig. 486. Cutting seed potatoes, Ukraine

Fig. 487. Market boats, Helsingfors, Finland

through which freedom of trade is impossible when they are held by unfriendly powers. But with its enormous size, its multitude of people, and its varied resources, a well-governed Russia should have a great future.

492. Ukraine.—The southern part of Russia, known as Ukraine, gained temporary independence but in 1920 fell under the soviet government of Russia. This region embraces a large part of the plains of southern Russia and includes most of the "black earth," which in richness and fertility is like the prairie soils of America. These lands produce large crops of wheat and other cereals and of vegetables (Fig. 486). In the valley of the Donetz are rich mines of coal and iron. The people of Ukraine, differing slightly from the Great Russians in race and language, are known as Little Russians.

493. Finland.—Finland lies north of the Gulf of Finland, and is separated from Sweden on the west by the Gulf of Bothnia.

The Finns are Asiatic in race and in their speech, and were for several centuries subject to Sweden. Finland was ceded to Russia in 1809, but enjoyed a good degree of self-government until 1898. Oppression by Russia followed, until the World War gave the Finns opportunity to declare their independence. They have now adopted a republican form of government. The people are advanced in education and industry. There is some mixture of Swedes in the population, and nearly all the people are Protestant.

Helsingfors (Fig. 487) is the capital and the largest city. Lumbering, farming, and dairying are leading industries, and the large forest resources have led to woodworking and paper making.

Review. — 1. Describe the surface of eastern Europe, from the Arctic Ocean to the Black Sea. 2. Describe the seas on the southern border.

3. What part of our country resembles Russia in climate? 4. Where are the principal forests? 5. Where is the black-earth region?

6. Who are the principal people of Russia in Europe? 7. Give an account of the government.

8. What grains are raised in Russia? 9. What grain is used in making the bread of the working people? 10. What vegetables are raised? 11. What valuable metal is found chiefly in Russia? In what part? 12. Name the leading manufacturing cities. 13. Why are manufactures likely to increase?

14. Name three Russian seaports. 15. Name the leading railroad center and the cities to which the principal lines extend. 16. What city is the capital of Russia?

17. Who are the principal people of Ukraine? 18. What are the chief industries?

19. What are the leading industries of Finland?

ARCTIC OCEAN
Bering Strait
C. Deshnef
ST. LAWRENCE I. (U.S.)
Arctic Circle
NORTH AMERICA
ASIA
EUROPE
Spitzbergen (Nor.)
FRANZ-JOSEF LAND
NOVA ZEMBLA
Barents Sea
Kara Sea
C. Chelyuskin
NEW SIBERIA IS.
WRANGELL I.
Tundra
SIBERIA
RUSSIA
Lena R.
Verkhoyansk
Yakutsk
Okhotsk
Sea of Okhotsk
Bering Sea
KAMCHATKA
Petropavlovsk
C. Lopatka
ALEUTIAN IS. (U.S.)
Mts.
Lower Tunguska R.
Angara R.
Lake Baikal
MONGOLIA
Nikolaievsk
Blagoveshchensk
Khabarovsk
Amur R.
SAKHALIN I.
NORTH ISLAND
HOKKAIDO
Hakodate
MANCHURIA
Harbin
Kirin
Vladivostok
CHOSEN
Sea of Japan
EMPIRE OF JAPAN
Tokyo
HONSHU
Yokohama
Osaka
Nagasaki
Pusan
Seoul
Mukden
Dairen
Kiaochow
Yellow Sea
Peking
Tientsin
Weihaiwei
Shanghai
East China Sea
Tropic of Cancer
CHINESE REPUBLIC
Sianfu
Nanking
Hangchow
Hankow
Foochow
TAIWAN (FORMOSA)
Canton
Hongkong
Macao (Port.)
Kwangchow (Fr.)
Yunnan
Hanoi
TONKIN
HAINAN
FRENCH INDO-CHINA
Hue
SIAM
Bangkok
Gulf of Siam
Malay Peninsula
FEDERATED MALAY STATES
Singapore
Saigon
C. Cambodia
LUZON
PHILIPPINE ISLANDS (U.S.)
Manila
Iloilo
Cebu
MINDANAO
PALAWAN
Sulu Sea
Celebes Sea
NEW GUINEA
BORNEO
CELEBES
Banda Sea
Arafura Sea
Equator
Pacific Ocean
Urga
MONGOLIA
OUTER MONGOLIA
INNER MONGOLIA
DESERT OF GOBI
Urumtsi
Turkestan
Tashkent
Kokand
Samarkand
Bokhara
Merv
Khiva
Aral Sea
Lake Aral
Lake Balkash
Kashgar
CHINESE TURKESTAN
Yarkand
TURKESTAN
Kuenlun Mts.
Tarim R.
Shan
TIBET
Lassa
Punakha
BHUTAN
Khatmandu
Kabul
AFGHANISTAN
Kandahar
Peshawar
Srinagar
Hindu Kush
Herat
Quetta
Lahore
Delhi
Agra
Lucknow
Benares
BRITISH INDIA
Khelat
BALUCHISTAN
Gwadar
Karachi
Muskat
Ahmadabad
Chandarnagar (Fr.)
Calcutta
Mandalay
BURMA
Akyab
Rangoon
Bassein
Maulmain
Bay of Bengal
Bombay
Daman
Hyderabad
DEKKAN
Yanaon (Fr.)
Madras
Pondicherry (Fr.)
Karikal (Fr.)
Mahe (Fr.)
Bangalore
Ghats
LACCADIVE ISLANDS
ANDAMAN IS.
NICOBAR IS.
CEYLON
Colombo
C. Comorin
Achin
SUMATRA
Palembang
BANKA
BILLITON
Banjermasin
Java Sea
JAVA
Sourabaya
Samarang
EAST INDIES
FLORES
TIMOR
Port.
AUSTRALIA
SUNDA ISLANDS
INDIAN OCEAN
Arabian Sea
Gulf of Aden
Aden
Mokha
HADRAMAUT
Red Sea
Suez Canal
Mecca
Medina
NEJD
ARABIA
Persian Gulf
Bushire
Kerman
PERSIA
Ispahan
Teheran
Bagdad
Mesopotamia
Euphrates R.
Tigris R.
Mosul
Kurdistan
Mts.
Elburz Mts.
Barfrush
Meshed
Merv
Koweit
Basra
Bahrein Is.
Jidda
Khartum
ANGLO-EGYPTIAN SUDAN
ABYSSINIA
Adowa
Massaua
ERITREA
ITALIAN SOMALILAND
KENYA
TANGANYIKA TERRITORY
Zanzibar
Mediterranean Sea
Black Sea
Caspian Sea
Sea of Azov
Constantinople
TURKEY
Angora
Smyrna
Adrianople
Athens
GREECE
Crete
Alexandria
Cairo
EGYPT
LIBYAN DESERT
Libya
Tripoli
Barca
Algiers
Tunis
Sicily
Malta
Italy
Rome
Vienna
Austria
Hungary
Budapest
Trieste
Venice
Switzerland
Alps
Berne
Paris
FRANCE
Marseilles
Spain
Madrid
Barcelona
Gibraltar
Portugal
Lisbon
ATLANTIC OCEAN
British Isles
London
North Sea
Berlin
GERMANY
Copenhagen
Denmark
Stockholm
SWEDEN
NORWAY
Christiania
Petrograd
FINLAND
Archangel
Moscow
Kazan
Tobolsk
Tiumen
Tomsk
Omsk
Irtish R.
Orenburg
Astrakhan
Volga R.
Caspian Sea
Kief
Dnieper R.
Odessa
RUMANIA
BULGARIA
SERVIA
GREECE
Saratov
Samara
Ural R.
Ural Mts.
Barnaul
Semipalatinsk
Irkutsk
Krasnoyarsk
Yenisei R.
Lake Baikal
Kiakhta
Maimatchin
Chita
Stanovoi Mts.
Amur R.
Fig. 488
Political
ASIA
Scale of Statute Miles
0 500 1000
946 MILES TO ONE INCH
Capitals thus: ◎
Railroads thus: ———
COPYRIGHT, BY AMERICAN BOOK COMPANY
THE MATTHEWS-NORTHRUP WORKS, BUFFALO, N.Y.
30° 40° 50° 60° 70° Longitude 80° East from 90° Greenwich 100 110 120 130 140

ASIA

	Area, Sq. Mi.	Population	Capital
Turkey in Asia	295,000	10,000,000	Angora
Syria	80,000	3,000,000	
Palestine	9,000	757,000	Jerusalem
Iraq	140,000	2,850,000	Bagdad
Hedjaz	140,000	600,000	Mekka
Aden, etc.	15,870	177,000	Aden
Oman	75,000	500,000	Maskat
Arabia (interior)	906,500	2,000,000	
Persia	635,000	9,500,000	Teheran
Afghanistan	240,900	6,380,000	Kabul
Indian Empire	1,856,500	319,075,000	Delhi
Nepal	54,000	5,600,000	Khatmandu
Bhutan	18,600	250,000	Punakha
Ceylon, etc.	25,500	4,568,000	Colombo
Siam	245,000	8,266,000	Bangkok
Fr. Indo-China	256,500	17,269,000	Hanoi
Straits Settlements, etc.	35,600	2,377,000	Singapore
East Indies	788,000	60,694,000	
China, etc.	4,300,000	320,880,000	Peking
Japanese Empire	261,300	77,606,000	Tokyo
Russia in Asia	6,721,500	41,037,000	

Map Study.—1. What is the latitude of Singapore, at the southern end of the Malay Peninsula? Of Cape Chelyuskin? 2. What is the difference in longitude between Smyrna in Asia Minor, and Bering Strait?

3. Where has Asia a land communication with Africa? 4. Name three great peninsulas on the south border of Asia (Fig. 489). 5. Give the water boundaries of the most westerly of these; of the middle one; of the most easterly. 6. Name and give the water boundaries of two peninsulas on the east border of Asia. 7. Beginning with the Caspian Sea, name in order the principal seas, gulfs, and bays along the border of the continent.

8. Through how many degrees of latitude does the island group of the Empire of Japan extend? 9. Locate Ceylon, Sumatra, Borneo, and the Philippine Islands.

10. Name in their order from east to west the three principal rivers that flow into the Arctic Ocean. 11. Describe the course of the Amur River, the Hwang, and the Yangtze. 12. Name two rivers that flow southward in Burma. 13. Name two rivers whose waters join before they enter the Bay of Bengal. 14. Describe the course of the Indus. Into what sea does it flow? 15. Name two rivers whose waters join before they enter the Persian Gulf.

16. Locate the Himalaya Mountains; the Tien Shan; the Altai Mountains; the Caucasus Mountains. 17. Compare, as regards rivers, the interior of Asia with the interior of North America. 18. Name and locate three large lakes in Asiatic Russia.

19. What countries border Asiatic Russia on the south? 20. What countries border British India? 21. Locate French Indo-China; the Straits Settlements; Oman; Aden. 22. Locate Manchuria; Mongolia; Tibet. 23. What two regions bear the name Turkestan?

24. Locate the capitals of China, Persia, British India, Siam, and the Empire of Japan. 25. Locate Jerusalem, Mekka, and Damascus in southwestern Asia. 26. Name and locate two important seaports of India. 27. Locate Hongkong, Canton, Shanghai, and Hankow in eastern Asia. 28. Locate Tomsk and Vladivostok in Asiatic Russia.

29. What countries of Asia are wholly or partly south of the Tropic of Cancer?

PHYSICAL GEOGRAPHY

494. Asia as a Continent.—Asia is nearly twice as large as North America and more than four times as large as Europe. Asia and Europe belong together when we think of them as a land surface, for they have a long land boundary in common; and they are sometimes included together under the name Eurasia. But when we consider their history, their people, and their trade, they may rightly be called separate continents.

Asia is more distinct from Africa than from Europe, being joined to Africa only by the Isthmus of Suez. But the peoples of Asia and those of northern Africa have had much intercourse with each other for thousands of

Fig. 489
Physical
ASIA

Fig. 490. Snow and glaciers on the Himalayas

years, because it has been easy for them either to pass over the Isthmus of Suez or to cross the Mediterranean or the Red Sea by boat.

In northern Asia are the vast plains of Siberia, but these plains are not so valuable as those of North America, South America, or Europe, because a large part of the region is so far north. In Asia there are large areas in the North Temperate Zone, but excepting eastern China, this region is generally either very dry or too high and cold for agriculture. The hot lands of Asia, however, have much greater area and are more important than those in the hot belt of North America.

495. Surface and Rivers.—The surface is high in the interior and, as a rule, low near the borders. Asia thus differs from Europe and North America, which have their large lowlands in the interior and their mountains on or near the borders.

The Himalaya Mountains (Fig. 490) extend east and west and contain the highest peaks on the globe. Hundreds of peaks, and even some ranges, are more than 20,000 feet high, and Mount Everest, believed to be the highest in the world, is about 29,000 feet in altitude. The Himalayas have many glaciers and snow fields, and in these mountains two of the great rivers of India, the Ganges and the Indus, have their headwaters. Under other names, the same system of mountains extends westward through Afghanistan, Persia, Caucasus, and Asia Minor, and is continued in the southern ranges of Europe. We may, therefore, think of one great line of elevations as reaching from the Pyrenees in western Europe to the southeastern parts of Asia.

North of the Himalayas, occupying all central Asia, is a vast region of plateaus and mountain ranges, of great height. The plateaus of Tibet, Turkestan, and Mongolia are very large. Tibet and Pamir have an altitude of more than 15,000 feet, or about three miles. Because the Pamir Plateau is so high, it is sometimes called "the roof of the world." Rising above the plateaus are many ranges of high mountains. They run in a general east and west direction, and are thus roughly parallel to the Himalayas. Among them are the Hindu Kush, Kuenlun, Tien Shan, and Altai ranges.

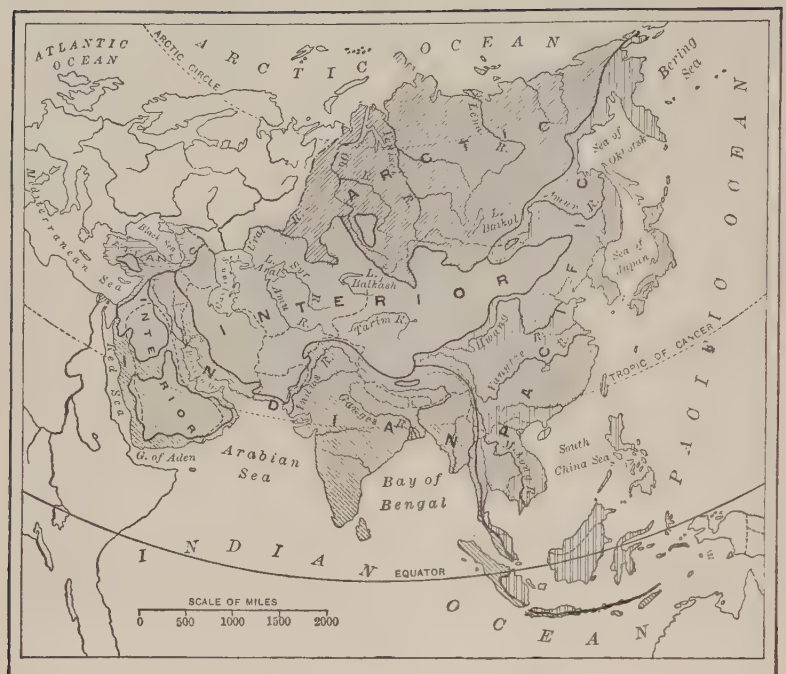

Fig. 491. Drainage basins of Asia

Out of the eastern parts of the central highland flow the headwaters of the Yangtze, the Hwang, and the Amur rivers. On the north slopes of the central highland the rivers of Siberia have their sources. They flow across the vast Siberian plains and enter the Arctic Ocean. They are navigable, but are not of much value for this purpose, because the Arctic Ocean is generally covered with ice, and is far from the commercial countries. The rivers also are so long from south to north that their northern courses are often frozen when the southern parts are open. This results in ice blockades and causes great floods. The rivers of China and of southern Asia are important for commerce, because they are large, are open to the sea, and flow through densely populated countries. Name six of them (Fig. 488).

The surface, climate, and drainage of Asia are such that the most people and the greatest trade must always be within 500 or at most 1000 miles of its borders. The shore line of Asia is irregular, though not so irregular as that of Europe. Some parts of the peninsulas of eastern and southern Asia are mountainous. These regions have many volcanoes and are shaken by violent earthquakes.

496. **Climate.**—Asia lies in the same zones as the continent of North America. The northern part of Siberia is intensely cold in winter, and the region where the Lena River crosses the Arctic Circle is one of the coldest places known in the world, having an average temperature in January of 60° below zero. The southern part of the Siberian plain has a cold-temperate climate, somewhat like that along the boundary between our western states and the Dominion of Canada. As the westerly winds first cross Europe and then pass for thousands of miles over the long stretches of Siberia, all the moderating effect of the Atlantic Ocean is lost. The climate of central Asia is continental: the summers are warm, and the winters are bitterly cold.

We have already learned that Russia in Europe, on its southeast border, is a steppe. The dry grasslands continue eastward over Turkestan and among the high plateaus of central Asia. Little moisture can come from the Atlantic or the Indian Ocean, and the central and west-central parts of Asia are mainly desert (Fig. 367).

The countries of southwestern Asia are largely desert because they are in the belt of the northeast trades, and these winds have moved for long distances across the inland parts of the continent. They have, therefore, gathered but little moisture, and they descend into the warmer lands of southwestern Asia as drying winds. They continue across Egypt and the Sahara in the same condition. Hence we find a desert stretching from

eastern central Asia across Asia and Africa to the Atlantic Ocean. This is by far the greatest desert area in the world. We know from the historical books of the Bible and from other ancient and modern writings that in all this region springs, wells, and rivers have always had the greatest value, in the raising of crops and in the locating of homes and routes of travel (Fig. 492).

Fig. 492. A well at Nazareth, in Palestine

The northern part of Asia is cold, and the central and western parts are dry; but the southeastern parts are wet and hot, and they contain about four fifths of the population of the continent. Southeastern Asia has about 700,000,000 people, and is far more densely populated than any other region of equal area in the world. This is due partly to its great and fertile plains, partly to climate, and partly to ample facilities for trade.

The climate is warm in the southern lowlands, because they are south of the Tropic of Cancer; and in eastern China the climate is tempered from the neighboring ocean. The rainfall of southern Asia (Fig. 493) is brought chiefly by the summer monsoons (Sec. 373).

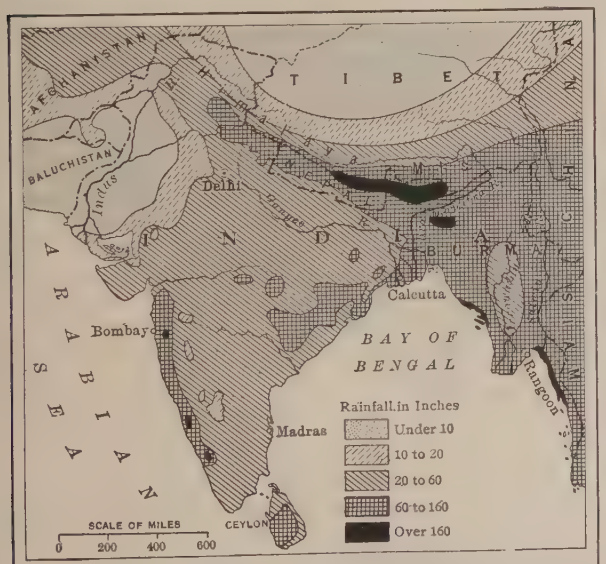

Fig. 493. Average annual rainfall in India

PLANTS AND ANIMALS

497. Vegetation.—Along the Arctic border the plains are tundras, frozen in winter, and thawing to a depth of a few feet during the short summer. Only grasses and other small plants flourish there. Southward there are heat and moisture enough for a belt of forest, in which evergreen trees, larches, and birches are common. South of the forest the dry region begins, first the steppes and then the mountains and plateaus, which are too high, dry, and cold for much vegetation. In southwestern Asia, wherever there is sufficient rain, or wherever irrigation is used, the vegetation, like that of southern Europe, is subtropical. In India, Indo-China, and the East Indies is the truly tropical country, with rank forests, dense jungles, and fields that produce several crops a year, because growth takes place throughout the twelve months.

498. Animals.—Most kinds of animals can move from one region to another while plants cannot, but still animals depend on climate, for they become accustomed to certain temperatures and suitable kinds of vegetable food. Thus we find that the reindeer is the important animal in northern Siberia. In winter it lives upon the mosses of the tun-

Fig. 494. Tiger

dra, which it reaches by pawing away the snow. In the forest belt are fur-bearing animals, — otter, beaver, sable, ermine, — whose pelts are taken to the fur markets of Russia, to the German fur center, Leipzig, and to other countries and cities. In the arid parts of Asia, sheep, goats, cattle, and horses are kept by the wandering tribes. In these regions the camel is one of the important beasts of burden, because of its ability to live for days without water.

In India elephants are found wild in the jungle, and are also domesticated and used to carry people, to haul heavy loads of merchandise, and even to pile timber. Lions, tigers, apes, and monkeys are found in the jungles, and crocodiles and numerous serpents live in the waters and the forests. Insects of all kinds abound, and some, as, for instance, certain species of ants, are very destructive. Boring worms destroy timber, and the people have to take many precautions to preserve health and property. The tropical belt, especially in the East Indies, has many birds of brilliant plumage.

Review.—1. How does the general surface of Asia differ from that of Europe, or of North America? 2. Give the name, altitude, and location of the highest mountain peak. 3. What is the height of the central plateaus? 4. Why are the Siberian rivers of small commercial value?

5. Describe the climate of Siberia; of western Asia. 6. Why is central Asia arid? Southwestern Asia? 7. What regions are included in the greatest desert of the world? 8. Where do most of the people of Asia live? 9. What are the monsoon winds? 10. What effect do they have on the climate of India and other parts of southern Asia? 11. Where is the heaviest rainfall in the world?

12. What kind of country is northern Siberia? 13. Where is the temperate forest area of Asia? 14. What are some of the domestic animals of Asia? 15. Name some of the important animals of tropical Asia.

PEOPLE AND INDUSTRIES

499. Races.—The majority of the inhabitants of Asia are *Mongolians*, and because of the color of their skin they are said to belong to the yellow race of mankind. To this race belong the Chinese, the Japanese, the people of the Indo-Chinese peninsula, and many of the people of the East Indies. Among the Mongolians who have settled in Europe are the Finns and others in the north, the Magyars

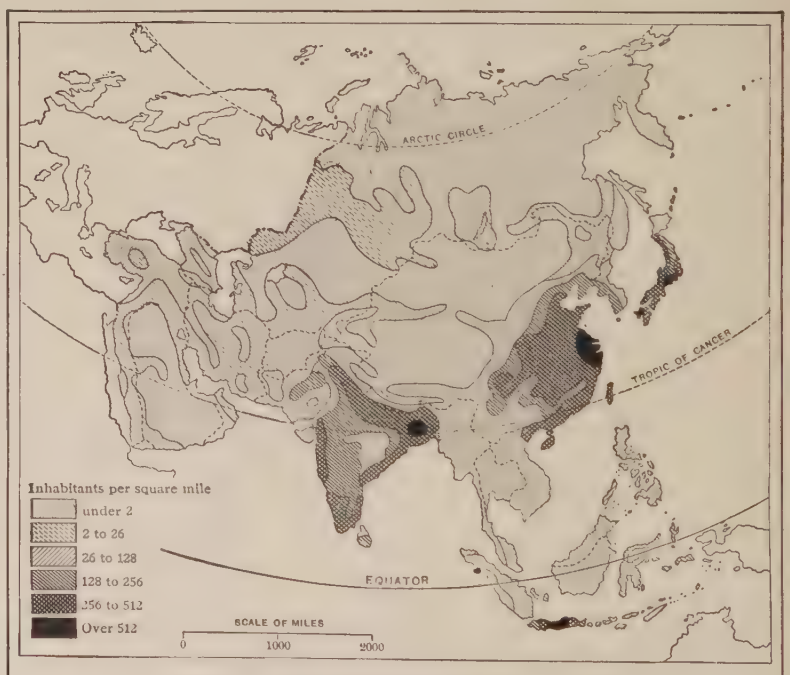

Fig. 495. Distribution of population in Asia

of Hungary, and the Turks of the Balkan Peninsula. The people of the yellow race are short and have black hair, high cheek bones, and narrow, oblique eyes; the men have scanty beards.

Many of the people of Asia are *Caucasians*, but this race is more numerous and more scattered in all parts of the world than the Mongolian race. We see, every day, that some members of the white race are light in the color of eyes, skin, and hair. We call these blondes. Others are dark in skin, eyes, and hair, and are called brunettes. These differences are found especially in America and between northern and southern Europe. The French, Spaniards, and Italians are usually dark. There are many million people in Asia belonging to the so-called white race, but they are usually of the dark kind, and some of them are almost as dark as negroes. People that have lived, as their ancestors have lived, for thousands of years under a hot sun, are darker than people whose ancestors have lived in a cooler climate, and under a dull sky, as in northern Europe.

Among the people of the white race are most of the inhabitants of India and a large part of the population of Asiatic Russia, Persia, Arabia, and neighboring lands. The Semitic people are white; the Jews and Arabs are branches of this people, as were also the ancient Babylonians and Assyrians of Mesopotamia.

In small parts of southeastern Asia are some groups of the black or *negro* race. In the northeast, near Bering Strait, are a few Eskimos, who, according to some scholars, belong to the red or *Indian* race.

500. Religion.—There are several kinds of religious belief in Asia. They all had their beginnings in Asia, and some of them have spread widely over other parts of the world.

Christianity had its origin among the Jewish people, in the life and teachings of Jesus. Christians believe in one God, in Jesus as the Savior of men, and in the Bible as the greatest source of religious and moral teaching. This faith has many followers in western Asia, and is the principal religion of Europe and the New World. It embraces most of the white race, and the most enlightened and progressive countries.

Fig. 496. Hindu temple at Benares, India

Brahmanism is the religion of the Hindus, or most of the people of India. Their name for God, or the Universal Spirit, is Brahma; but they worship many gods. The people are divided into classes or castes, and the members of one caste will have nothing to do with members of another. People of the lowest class are considered as outcasts. Modern government and schools and the teachings of missionaries are slowly breaking down the cruel caste system.

Buddhism was founded on the teachings of an ancient prince in northern India who was given the title of Buddha. He rejected the idea of castes and taught a life of purity

and kindness. His followers are Buddhists. They are not numerous in his native country, but are counted by hundreds of millions in other countries, mainly in China, Japan, and Indo-China.

The Chinese are devoted to the worship of their ancestors, and nearly all — whether Buddhists or not — accept the moral teachings of Confucius, who lived and taught at the end of the sixth and the beginning of the fifth century before Christ.

Mohammedanism is the religion founded by Mohammed, a religious teacher who lived in Arabia about six hundred years after Christ. His followers are called Mohammedans. Their creed is, " there is one God, and Mohammed is his prophet." Their sacred book is the Koran. In past centuries they often compelled people by the sword to accept their faith, and they are numerous in southwestern Asia, India, and north Africa. At one time they conquered much of Spain (Sec. 458). Their sacred city is Mekka, and a railroad is being extended from the north to that city, chiefly to accommodate Mohammedan pilgrims.

The *Hebrews* of the present day receive their faith from the ancient Jewish people. They believe in one God, and accept the Old Testament as their Bible. They reject the New Testament as not being a part of the Bible, and do not believe that Jesus was the Messiah or Savior. They have been much persecuted and are now widely scattered among the countries of Europe and America.

In addition to the forms of religion already described, many savages and rude tribes in various parts of the world scarcely have a religion, and are called *pagans*. They believe in many gods, or good and evil spirits, and worship images or idols.

Fig. 497. A nomad family, Persia

501. Agriculture.—Agriculture in Asia goes back to times so ancient that we have no record of its beginnings. No one knows when the chief grains and fruits were improved from wild plants, and no one knows when or where cattle, horses, dogs, camels, and other animals were domesticated and made to serve man.

More of the people of Asia are engaged in cultivating the soil than in any other occupation. This is especially true in eastern and southeastern Asia, where the climate is warm and rain plentiful. It is because of these conditions that so many people can live in those parts of Asia. Nearly half the human race live on the warm and fertile side of this one continent. They are overcrowded there, and when a crop fails or is short, famine follows and thousands die of starvation.

In the central, northern, and western parts of Asia the country is generally too cold or too dry for agriculture. Near springs of water and along streams, the water has been used for centuries to irrigate the fields, and some crops are raised. A place in the desert that is naturally or artificially watered and made green and fruitful is called an *oasis*. At such a place a village usually grows up, and here caravans stop on their journeys across the desert.

502. Nomadic Peoples.—Many of the people do not try to live by agriculture, but wander from place to place. They are called *nomads*, and they look down on farmers as inferior people.

The natives of northern Siberia live in the far north only in the short summer. The reindeer is their beast of burden and is useful for its milk, its hide, and its bones, which are used for making tools. In summer the natives gather wild berries, and catch fish for summer food and to dry for winter use. In the winter they move southward into the edge of the Siberian forests. They live in rude tents, and the women stay at home and prepare the food, make the clothing out of skins, and care for the animals. The men go out in the forest and hunt for animals that yield furs. When summer comes they go back again to the tundra.

Fig. 498. Stamping the pattern on cloth in India

The people of the deserts and steppes also are nomads. They have many horses, camels, cattle, and sheep. These require pasture, and as grass is scattered or in patches, the family must move, sometimes every day, sometimes at greater intervals, depending on how long the pasturage holds out. Not only one family, but the sons and their families, and the servants as well, stay together, and thus the family becomes a tribe. The men of the steppe are expert horsemen from childhood, and wealth consists in owning many horses and other animals. Here, as in the tundra, the women do most of the drudgery of the camp. The customs of these people make them independent and brave. Many pictures of life such as theirs are found in the historical books and poems of the Old Testament. The desert people do not change their habits, and we find them to-day living much as they lived in the days of Abraham.

503. Fishing.—Among the tribes in the northern and northeastern parts of the continent, fishing and hunting furnish a large part of the food. Fishing is also an important industry among the Japanese and Chinese.

504. Mining and Manufactures. — The mineral wealth of Asia is enormous, but only a small part of the mineral riches of the continent have been worked in any systematic way.

Manufactures are not so extensive or so greatly varied in Asia as they are in Europe or North America, for the people are not so progressive. They have never invented fine machinery, and their chief products are made by hand and in their homes. Nevertheless, many of them are skillful and show much taste in making objects of beautiful forms and colors. The Chinese and Japanese make silks and pottery that win the admiration of the world, and the people of the drier lands of western Asia have for hundreds of years made the finest and rarest rugs and carpets. These are woven on hand looms, and months and sometimes years are spent on a single piece. The fibers are from the wool and hair of sheep, goats, and other animals, and are colored with dyes made from plants. In recent years these rugs have been much sought by people in Europe and America, and the demand has led to the building of factories and to the making of many rugs of poorer quality.

505. Ancient Routes of Trade.—Long before the time of Christ the Asiatic peoples traded with one another. They followed well-beaten trails, and their caravans went between China and India on the east, across the plateaus and over the mountain passes to Persia, to the regions along the Euphrates, and to the shores of the Mediterranean. It was also before the Christian era that the people of Europe began to want the tea,

the fabrics, the jewels, and the spices of the East. Much of this trade was carried on by the Phœnicians, who lived in Tyre and Sidon, ancient cities at the east end of the Mediterranean Sea. They received the goods from the caravans and took them westward in their ships. After a time the Roman people controlled the trade, and later the citizens of Venice and Genoa, great commercial cities of Italy, were the chief traders. About the time America was discovered, a way was found to the East around the Cape of Good Hope, and the land routes of Asia became of less importance. Many of them, however, are still used.

506. The Awakening of Asia.—Most of the people of Asia have been satisfied to do the same things in the same ways for thousands of years. This is shown in the worship of ancestors in China, the caste system of India, and the ways of life in the desert. But many changes are now taking place. Foreign nations have pressed into Asia for conquest, for commerce, and for missionary work.

Many years ago the Japanese opened some of their ports to foreign trade. Gradually China has pursued the same course. Great Britain founded a great commercial city on the island of Hongkong just off the shores of China. The British have also for a long time ruled the three hundred million people of India. They have built railroads, founded schools, introduced machinery, and developed agriculture. The Russians have extended their control over northern Asia, and have built several railroads. Japan is one of the most progressive nations, and China is building railroads and modern factories.

Indian, Chinese, and Japanese young men and women study in the schools of Europe and America. Some of them have been sent by their governments to learn the ways of the West so that they may introduce them into the Orient. In southwestern Asia, rapid changes are resulting from the World War. The ending of Turkish misrule made it possible for Syria, Palestine, and other lands to progress in agriculture, manufacturing, commerce, and education. The entire continent is rapidly advancing and taking its place as a part of the modern world.

Review.—1. Give an account of the distribution of the yellow race. 2. Where, in Asia, are people of the white race found?

3. Name and briefly describe each of the chief forms of religion in Asia. 4. What is a pagan?

5. In what part of Asia is agriculture chiefly pursued? 6. Describe the life of the northern nomads; of the desert nomads. 7. Name some of the chief articles manufactured by Asiatic people. 8. Give an account of the Phœnicians. 9. What changes show that Asia is becoming more modern and enlightened?

Fig. 499. School in Persia

Fig. 500. Railroad station, Bombay

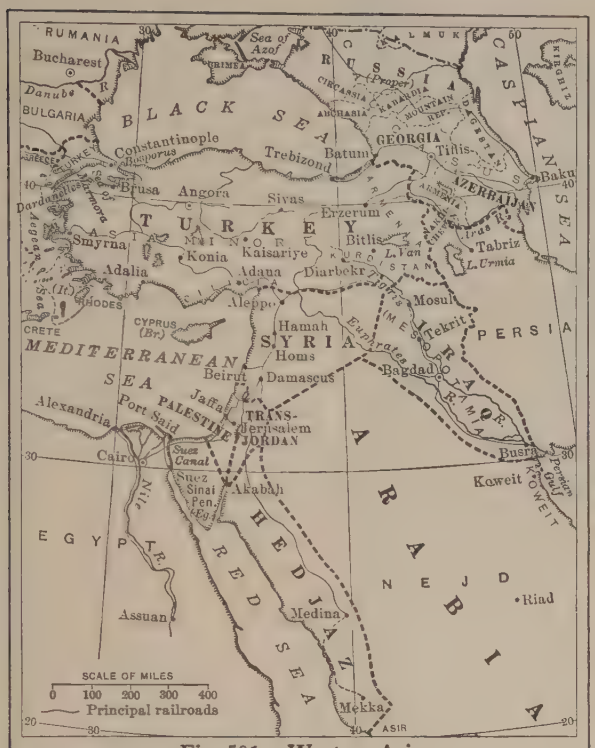

Fig. 501. Western Asia

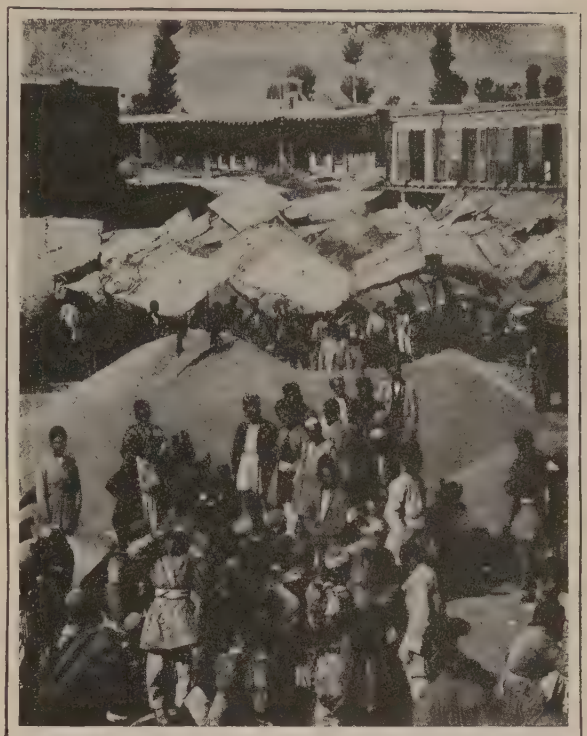

Fig. 502. A mound of wheat in an Armenian market

THE COUNTRIES OF SOUTH-WESTERN ASIA

507. Turkey.—The westernmost country of Asia is Turkey. It occupies Asia Minor, the peninsula that has the Black Sea on the north, the Aegean Sea on the west, and the Mediterranean Sea on the south. It is a rugged plateau bordered by ranges of mountains on the north and south.

Centuries of misrule have kept the people in ignorance and poverty. Turkish industry, therefore, is very primitive. Cereals, tobacco, cotton, fruits, and nuts are, with wool and mohair, the principal products. The country is rich in petroleum and minerals, and the fisheries are important. Textile manufactures are increasing.

Angora is the capital. The chief seaport is Smyrna. Trebizond has long been the starting point of caravans going to Persia.

Northeastern Turkey includes most of Armenia, which for a short time after the World War was an independent country. It is a mountainous land where the chief industries are farming and grazing. The Armenians are of the white race and hold the Christian faith. For a long time they have been bitterly persecuted by the Turks and by savage tribesmen known as Kurds. The small part of Armenia that is not in Turkey is a republic under the control of Russia.

508. Syria and Palestine.—Syria lies east of the Mediterranean Sea. In Syria, north of Palestine, is the Lebanon mountain range, still bearing such giant cedars as are mentioned in the Bible. Aleppo is a commercial center in northern Syria. Damascus, in an oasis, is the chief city of the country. In the World War, French forces occupied the Syrian coast, and after the war Syria was made a French protectorate.

Near Syria is the large island of Cyprus. It was occupied by the Phœnicians three thousand years ago. It has since had many rulers, but is now governed by Great Britain.

Fig. 503
PALESTINE
Scale of Statute Miles
0 5 10 20
12 MILES TO ONE INCH
Main Highways:
Railroads in operation:
Proposed Railroads:
ELEVATIONS IN FEET
OVER 3000
2000 TO 3000
1000 TO 2000
500 TO 1000
SEA LEVEL TO 500
BELOW MEDITERRANEAN SEA
All place names are Biblical or Historical except those in parenthesis (Acre), which are Modern place names.
Longitude East from Greenwich
34°30′
35°
35°30′
36°
33°
32°30′
32°
31°30′
31°
MEDITERRANEAN SEA
DEAD SEA (The Salt Sea) 1292 feet below the Mediterranean
Helepb
Kedesh Naphtali
Ladder of Tyrus
Abdon, Hebron
Achzib
Iron
Waters of Merom 7 ft above Med. Sea
Zebulun
Dabbasheth
Mishal or Mishel
Beth Emek
Achshaph
Ramah
Accho
Ptolemais (Acre)
Akka
Chorazin
Bethsaida Julias
Mound Faras
Capernaum
Bethsaida
Beth Dagon
Cabul
Magdala
Sea of Galilee
Lake of Gennesaret
682.5 feet below Med. Sea
Ras el Kerum
Bay of Acre
Shikmonah
(Haifa)
Rumah
Kirn Hattin
Toran
Tiberias
Gamala
Kitron
Cana of Galilee
Tarichaea
Jaroshetb
Mt. Carmel
Shimron
Nazareth
Mt. Tabor 1843
Maralah
Zaphon
Gadara
Abila
(Mezeib)
Nain
Endor
Little Hermon
Dor
R. ed Dufleh
Shunem
Capitolias
Kamon
Ramath Mizpeh
Afbela
Tell el Mutasellim
Megiddo
(Afulah)
Jezreel
Well of Harod
Taanach
Ford of Abara
Bethabara
Caesarea
Bethshean
Scythopolis
Engannim
(Jenin)
Mt. Gilboa
Pella
Jabesh Gilead
R. Iskanderuneh
Dothan
Jarmuth
Ramoth
Bethulia
Samur
Mt. Kafkafa
Geba
Thebez
Tirzah
Mizpeh
Pirathon
Samaria
Pulmza
Ramoth Gilead
Gerasa
Mt. Ebal 3,64
Mt. Kakart
Shechem
(Nablous)
Mt. Gerizim 2849
Salim
Joseph's Tomb
Jacob's Well
Apollonia
Mt. Mastabeh
Tiphsah
Gibeah
Ekrebel
Antipatris
Mount of Gaash
Gilead
Adam
Joppa
(Jaffa)
Jehud
Mount Ephraim
Lebonah
Shiloh
Mt. Gilead
Jogbehah
Ed
Gath Rimmon
Lydda
Gibbethon
Modin
Philadelphia
Rabbath Ammon
Gimzo
Bethel
Berea
Rock Oreb
Jabneel
Ekron
Beth-Horon Lower
Beth-Horon Upper
Jericho
Gezer
Ajalon
Gibeon
Ramah
Cedron
Emmaus
Mizpeh
Adummim
Beth Hoglah
Beth-Haram
Heshbon
Ford of Hajlah
Azotus
Zorah
Eshtaol
Chesalon
En-Shemesh
Beth-Jeshimoth
Mt. Pisgah
Mt. Nebo
Mekonah
Jerusalem
Shaphir
Bittir
Rachels Tomb
Mar Saba
Gath
Bethlehem
Field of the Shepherds
Medeba
Midgal-Gad
Ascalon
Mt. Peor
Meronoth
Tekoa
Eleutheropolis
Maarath
Callirhoe
Ataroth
Kiriathaim
Eglon
Mareshah
Halhul
Machaerus
Cabbon
Beth-Zur
Beth-Gamul
Lachish
Dannah
Hebron
Dibon
Gaza
Etam
Aroer
En Gedi
Gerar
Debir
Sharuhen
Madmannah
Zanoah
Jattir
Middin
Mt. Ghweltheh
Masada
Mt. Shihan
Ar. of Moab
Kh. Hora
Jeshua
Beersheba
Sheba
Adadah
Mt. Tarfuyeh
Kir of Moab
I D U M E A
Mt. Usdum
Valley of Salt
PILGRIMS' ROUTE TO MEKKA
HEDJAZ
THE MATTHEWS-NORTHRUP WORKS, BUFFALO, N.Y.
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In the World War Palestine, the "Holy Land," was wrested from the Turk after centuries of corrupt rule. Many Jews plan to go there to set up a new Zionist Republic, under British protection.

Fig. 504. Jerusalem. The large dome at the far left is on the Church of the Holy Sepulcher

Palestine is a small country, but is of great interest because here the most important events of Hebrew history took place. Here Jesus lived, and the Christian church was founded. On the Mediterranean side is a coastal plain, the land of the ancient Philistines. Here is Jaffa, the seaport of Jerusalem. Back of the plain is a range of low limestone mountains. On the top of this range is Jerusalem, the Holy City (Fig. 504), and a few miles south is Bethlehem, the birthplace of Jesus.

East of this ridge is the deep valley of the Jordan and the Dead Sea. The Jordan rises in a great spring south of Mount Hermon, flows through the Sea of Galilee and down to the Dead Sea. This latter sea is in so hot a region, and the rainfall is so small, that it has no outlet and is a salt lake. Its surface is 1292 feet below sea level, and it is so salt that no fish can live in it. The southern part of Palestine was the ancient Judea, and the northern part was Galilee, containing Nazareth, the home of Jesus.

Palestine is called in the Old Testament a land flowing with milk and honey, but this statement is far from being true now. Since those early days the country has been sadly neglected, its trees have been cut away, and the soil has been washed from the hillsides. At the present time it is beginning to prosper again under modern enterprise.

A railroad extends from Jaffa to Jerusalem. Another runs from Damascus to the sea at Beirut, and a long line, nearly completed, extends from Smyrna to Damascus, and far southward. It will be continued to the outskirts of Mekka, the sacred city of the Mohammedans. Another railroad is planned to cross Syria and Mesopotamia from the Mediterranean Sea to the Persian Gulf.

509. Iraq and Arabia.—Iraq, also called Mesopotamia ("between the rivers"), is the region of lowland along the Tigris and Euphrates rivers. It was the seat of ancient empires and of the cities of Nineveh and Babylon. Here, as in Egypt, irrigation was practiced in ancient times and its use is again increasing with the revival of agriculture. One of the chief resources is petroleum, of which large amounts are obtained. Bagdad is the principal city. Goods and passengers are carried on the rivers by rafts and steamboats.

Iraq is an Arab kingdom under the protection of Great Britain.

Arabia is an immense peninsula, one third the size of the United States. It is widest at the south, and is bordered on the west by the Red Sea, on the south by the Arabian Sea, and on the east by the Persian Gulf. It is mainly a high plateau with a very dry climate. Much of it has never been explored.

The kingdom of Hedjaz, with British aid, threw off the Turkish yoke in 1916. This small country on the eastern shore of the Red Sea contains the important Mohammedan cities of Mekka and Medina, and aims to become the nucleus of a greater Arabia.

Asir and Yemen, former Turkish provinces southward from Hedjaz, are small agricultural states. Yemen exports coffee.

Fig. 505. Plowing in Persia. The plow is drawn by eight buffaloes

Aden, at the southwest end of the peninsula, is owned by Great Britain and is an important coaling station.

Oman is an independent state. Its seaport is Maskat, from which many dates are sent to the United States. In the Persian Gulf are important pearl fisheries.

The interior of Arabia has no single government. Its wandering Arab inhabitants are called Bedouins, and the tribes are under native chiefs called sheiks. The people are few, and only small districts can be cultivated.

The Red Sea on the one side, and the Persian Gulf on the other, were important routes of commerce in ancient times, and since the Suez Canal was constructed the Red Sea has again become a great trade route.

510. Persia.—Persia is an ancient country, and many centuries ago it was very large, reaching from the Mediterranean Sea to India. It is now a country nearly three times as large as France, but has less than one fourth as many people. So much of it is desert or barren mountain side that food for a large population cannot be raised. Much more of everything could be produced, however, if the people had the skill and the machinery that are common in Europe and America. Figure 505 shows the clumsy Persian method of plowing.

The surface of Persia is a plateau with many mountains and valleys. Over much of the area the rainfall averages only about five inches a year. There are few rivers and many deserts. The streams usually disappear in the desert sands. The snow and rain of the mountains supply such streams as the country has, and the water is used in the valleys for irrigation. The northern part of the country, around the Caspian Sea, has a more moist climate and considerable forest, but it is unhealthful. Silk, wool, cotton, tobacco, wheat, and barley are common products of Persia, as are fruits and gums.

Many sheep and cattle are raised. Much of the wool is used in making beautiful rugs and shawls. They are among the finest of those produced in Asia. The rugs (Fig. 506) are known by the name of the city or province in which they were made, each district having had for hundreds of years its favorite colors and designs. Many of these rugs are sold in America.

The mineral wealth of Persia is undeveloped, but there is evidence that the country is rich in petroleum. Many borings have

Fig. 506. A rug being made by hand in Persia

already been made and oil is being shipped in increasing quantities.

Nearly all the Persians are Mohammedans in faith. The greater number lead a settled life in towns and cities, but there are many tribes of nomads or wanderers (Fig. 497).

In 1906 a constitution was granted to the people by the Shah, as the ruler is called, and a government was organized to meet the desires of the more intelligent Persians.

The cities have fine mosques and some beautiful shops (Fig. 507). The houses are usually made of dried mud and the windows face an inner court, leaving the street blank and unattractive. Teheran, the capital and largest city, has made much progress. Ispahan was formerly the capital.

By the Persian Gulf the country communicates with Bombay and other ports of India. On the west, caravan routes lead to the Black and Mediterranean seas. On the north, the Russians have built a railroad to the boundary. The roads in Persia are poor. Travel has always been by means of animals, but recently automobiles have been introduced.

511. Afghanistan.—Afghanistan lies between Persia and India. It is nearly as large as the state of Texas, or the Canadian province of Saskatchewan. There are about six million people. The ruler is called the Ameer.

Most of the country is mountainous. In the fertile plains and valleys grain and many varieties of fruit are grown in abundance. Preserved fruits are exported.

Review.—1. Describe the surface of Palestine. 2. Give an account of the Jordan and the Dead Sea. 3. Locate Jerusalem, Bethlehem, and Jaffa. 4. What changes have taken place in Palestine? 5. What country governs Cyprus? 6. Where is Iraq? Syria? Armenia? Turkey? 7. Give an account of Hedjaz and its capital. 8. Where are Oman and Aden? 9. What is the ruler of Persia called? 10. Compare Persia with France as to size and population. 11. How do the Persian rugs compare with those made in other parts of Asia? Where are many of them sold? 12. What is the condition of transportation in Persia? 13. Describe Afghanistan.

Fig. 507. Mosque in a Persian city

Fig. 508
Physical and Political
INDIA AND INDO-CHINA
Scale of Statute Miles
0 50 100 200 300 400 500
353 MILES TO ONE INCH
Capitals: ⊙ Railroads:
ELEVATIONS IN FEET
OVER 15000
5000 TO 15000
2000 TO 5000
1000 TO 2000
500 TO 1000
SEA LEVEL TO 500
Arabian Sea
Bay of Bengal
INDIAN OCEAN
Plateau of Tibet
AFGHANISTAN
BALUCHISTAN
Great Desert
Khyber Pass
Bolan Pass
Himalaya Mts.
Karakoram Mts.
Hindu Kush
Pamir
Mt. Godwin Austen
Mt. Everest
Brahmaputra R.
Indus R.
Ganges R.
Mouths of the Indus
Mouths of the Ganges
Gulf of Cutch
Gulf of Cambay
Gulf of Manar
Gulf of Martaban
Gulf of Siam
Malabar Coast
Coromandel Coast
Western Ghats
Eastern Ghats
Deccan
Laccadive Islands
Andaman Is.
Nicobar Is.
Maldive Islands
CEYLON
Mergui Archipelago
Isthmus of Kra
Isthmus of Ligor
Strait of Malakka
Malay Peninsula
Tropic of Cancer
Equator
Kabul
Herat
Kandahar
Ghazni
Quetta
Khelat
Peshawar
Rawalpindi
Srinagar
Lahore
Amritsar
Simla
Ambala
Multan
Patiala
Delhi
Agra
Lucknow
Cawnpore
Allahabad
Benares
Patna
Gaya
Bhagalpur
Murshidabad
Jaipur
Ajmer
Jodhpur
Bikaner
Alwar
Gwalior
Jhansi
Jabalpur
Nagpur
Bhopal
Indore
Baroda
Ahmadabad
Cambay
Bhaunagar
Surat
Daman
Karachi
Hyderabad
Gwadar
Las Bela
Shikarpur
Aurangabad
Bombay
Poona
Sholapur
Kolhapur
Hubli
Bellary
Goa
Mangalore
Bangalore
Seringapatam
Mysore
Mahe
Calicut
Salem
Trichinopoli
Madura
Tuticorin
C. Comorin
Negapatam
Pondicherry
Karikal
Madras
Nellore
Ongole
Masulipatam
Yanaon
Vizagapatam
Cuttack
Puri
Calcutta
Chandarnagar
Chittagong
Akyab
Arakan
Sylhet
Manipur
Assam
Shillong
Gauhati
Dacca
Bhamo
Mandalay
Ava
Thayetmyo
Prome
Pegu
Rangoon
Bassein
Moulmain
C. Negrais
Port Blair
Andaman Is.
Nicobar Is.
Mergui
Tenasserim
Chantibon
Bangkok
Ayuthia
Raheng
Chiengmai
Kerat
Bassak
Pnum Penh
Saigon
Battambang
Tonle Sap
Cambodia
Siam
Annam
Tonkin
Hanoi
Haifong
Vinh
Hue
Tourane
Quinhon
Luang Prabang
Kianghsen
Yunnan
Likiang
Kuiyang
Lassa
Punakha
Bhutan
Khatmandu
Drilling
Tali
Lungchow
Georgetown
Penang
Sumatra
Federated Malay States
Colombo
Kandy
Galle
Jaffna
Longitude East from Greenwich
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INDIA

512. Size.—India proper occupies the central peninsula of southern Asia, together with large regions to the north. Bordering it on the west is the desert country of Baluchistan. The Indian Empire under British control includes India proper and Baluchistan, and also Burma, which extends over the west side of the Indo-Chinese peninsula. The total area of this greater India is only three fifths that of the United States, but it contains more than 300,000,000 people. Besides the Hindus, there are in India many different peoples speaking various languages.

513. Surface.—The surface of India may be divided into three main parts, — mountain, lowland, and plateau.

The first region is the southern portion of the Himalaya Mountains. Even the passes over these mountain ranges are from 16,000 to 19,000 feet above the sea, or higher than the highest peaks of the Alps. Here are the sources of the two principal rivers of India, the Ganges and the Indus. The Indus flows southwest and enters the head of the Arabian Sea. The Ganges receives many rivers from the mountains, flows southeast, and enters the Bay of Bengal. Near its mouth it is joined by the Brahmaputra, which is 1800 miles long, or longer than the Ganges itself. This river comes from Tibet, north of the Himalayas. The combined rivers have built a very large delta.

The second region consists of the lowlands of both the Indus and the Ganges. These rivers and their tributaries have spread out the waste from the mountains into wide flood plains, which make up the lowland of India, extending from the Arabian Sea across to the Bay of Bengal. Except some desert ground near the Indus, this plain is densely populated and has many cities.

The third region is the central and southern part of the peninsula, which is a plateau called the Dekkan. Much of this upland is a half mile above the sea, and the larger part of it is covered by ancient lavas, which in some places are more than a mile thick. The surface long ago weathered into soil. There are many mountains in the Dekkan.

The coast line of India is little broken, and there are but few good harbors.

514. Irrigation.—The lower Ganges flows through a region of heavy rains (Sec. 373). During the summer monsoons the western coast of India from Bombay southward is well watered. The winter monsoons give rain in Ceylon and the adjacent parts of the mainland coast. But much of India is so dry, at least a part of the year, that irrigation is needed. The natives dug irrigation canals centuries ago, but the British people have greatly extended irrigation, and have made India the first country in the world in this respect. In years of serious drought, however, the people of a large part of India are in danger of starvation. There has been much loss of life in this way, in spite of help from the government and of gifts of private charity from other lands.

Fig. 509. Shore of the Ganges River at Benares

515. Agriculture.—The three principal grains raised in India are wheat, millet, and rice. Wheat is raised in the lowlands of the northwest, also in the Dekkan Plateau, and some of the crop is exported. Much of it is taken to Karachi, near the mouth of the Indus, and much goes to Bombay, and is there made into flour. Most of the people are too poor to eat wheat bread, and many use millet. In the lowlands of the lower Ganges, where the fields can be easily flooded, is one of the great rice regions of the world. Two crops a year are usually raised. Not much of the rice that we buy comes from this part of India, for most of the crops there are needed at home. Burma exports more rice than any other region. One third of the people of the globe—including many of the people of India and China—find in rice their chief food.

Fig. 510. A banyan tree

Much cotton is raised in the central parts of India. Some of it is sent to English factories and some is spun and woven in the cotton mills of India. Jute, a tall plant, yields a silky fiber used in adulterating fine woven goods of many kinds, as well as in making ropes and bagging. Silk is produced, but not so extensively as in China. Cinnamon and pepper are among the spices raised in India. Sugar cane and oil seeds, including flax, are important crops.

Tea is one of the chief products. It is grown especially in the lower valley of the Brahmaputra. Much tea is exported from this part of India.

516. Lumbering and Other Industries.—Teak is a hard and durable wood that grows in several parts of India and is valuable for shipbuilding and for furniture. It is not usually attacked by the insects that destroy softer woods. Some teak trees are 200 feet high. They are generally girdled, and killed, two years before they are cut, so that the wood may season while standing. Teak leaves furnish a purple dye for silk and cotton goods. The bamboo (Fig. 530) is used for many implements and in the construction of the light, simple houses of the natives. The banyan is a curious, spreading tree with many trunks (Fig. 510). Palms and coconut trees furnish drink and food.

Many cattle are raised, but chiefly for domestic use. Hides and skins, however, are exported in large numbers.

The mineral deposits are valuable and include coal, iron, petroleum, and gold.

517. Government.—Three hundred years ago Great Britain, France, and Portugal began to trade with India, and the British after a time gained control of nearly all the country. Many native states still have their own governments, under British influence, but since 1858 most of the land has been directly under British rule. The king of Great Britain now has the title emperor of India, and the British government appoints a viceroy who is the actual ruler. In 1912 the capital was removed from Calcutta to Delhi, the ancient capital of a former native empire.

It is the policy of the government to give the natives a gradually increasing share in the management of affairs. Much has been done for India by British rule. Irrigation has been extended, better and cleaner ways of living promoted, schools supported, and more than 30,000 miles of railroad have been built. Before 1858 there were less than 1000 post-offices, while now there are about 20,000.

Fig. 511. Bombay, India

518. Cities.—Calcutta is the largest city of India, with about 1,300,000 people. It is on the delta of the Ganges and is a great commercial city in spite of its poor harbor. Bombay (Fig. 511) is the second city. Since it has been possible for ships to come from Europe to Asia by the Mediterranean Sea, the Suez Canal, and the Red Sea, Bombay has become an important seaport. Madras is a port in southern India. Hyderabad is the largest city of the interior. Benares is on the Ganges (Fig. 509), and both the river and the city are regarded as holy by the Hindu people. They believe that they receive blessing by drinking or bathing in the water of the river, or by making pilgrimages to the city.

Fig. 512. A street in Rangoon, Burma

519. Burma.—Burma is a large province with more than 13,000,000 people of various races. Only a small part of the country is under cultivation, but under British control conditions are improving. Rangoon is the largest city and chief seaport (Fig. 512). It exports much teakwood and rice. Mandalay is the chief city of the interior. · On what river is it (Fig. 508)?

520. Nepal and Bhutan.—The small countries of Nepal and Bhutan, in the mountains north of India, are called independent; but they are under British protection. Nepal has several million inhabitants. Most of them are people called Gurkhas, and many of the men are soldiers in the British army.

521. Ceylon.—The island of Ceylon has been for a hundred years under British rule. It is a colony by itself, not part of British India. The area and population are nearly as great as those of Ireland. It is one of the three largest tea-raising regions in the world, and raises rubber, coconuts, and other tropical products. Sapphires and other gems are found, and there are pearl fisheries. Much graphite is mined and exported. The main port, Colombo, is one of the great coaling places for ships engaged in Asiatic trade (Fig. 513).

Fig. 513. Port of Colombo, Ceylon

Fig. 514. Rubber plantation near Singapore

SOUTHEASTERN ASIA

522. Indo-China.—The peninsula of Indo-China includes Burma (Sec. 519) and the countries southeast of it.

The Malay Peninsula, narrow and mountainous, stretches far southward from Burma. The southern end of the peninsula is known as the Straits Settlements, because bordered by the Strait of Malakka, which separates the mainland from Sumatra. The Settlements form a British colony, and connected with it are a number of Malay states that are under the protection of the British government. This region produces a great variety of tropical gums, spices, fruits, and grains, but the best-known exports are rubber and tin, of which a large part of the world's supply comes from this region. The barbarous natives have become orderly and somewhat civilized through steady employment in producing tin and rubber.

Singapore, on an island near the end of the peninsula, is a large city founded by the English, and is a very important port, because it is on the route of all ships sailing around the south shore of Asia.

East of Burma are two countries, Siam and French Indo-China. In both of them, mountain ranges run from north to south. The Mekong is a great river on the boundary of the two countries.

Siam is not quite so large as Texas, but has nearly twice as many people. As in India, rice and millet are important crops, and tin, gold, and gems are among the minerals found. Here also teakwood is one of the most valuable products. The government is an absolute monarchy — one of the few still existing. The capital is Bangkok (Fig. 515), a city intersected by the Menam River and by many canals. On these waters thousands of the inhabitants live in floating homes or houseboats.

The French possessions are about as large as Texas, and have nearly four times as many people. The products are like those of other countries of southern Asia, including teakwood, millet and rice, spices, tea, cotton, and silk. Hanoi, the capital of French Indo-China, and Saigon, near the sea, are important cities.

Fig. 515. Bangkok. Notice the houseboats along the shore

Fig. 516. Irrigating rice terraces in Java

523. East Indies.—The East Indies (or Malay Archipelago) are the islands lying between Asia and Australia. All except certain islands that are close to Australia are considered as belonging to Asia. The waters about them are not so deep as in most parts of the ocean. These islands are largely of volcanic origin. Active volcanoes are numerous and earthquakes occur frequently. The vegetable and mineral products are like those of the neighboring parts of the mainland.

More of these islands belong to the Netherlands than to any other country. They are known as the Dutch East Indies. All together they have a surface almost one fourth as large as the United States, and contain nearly 50,000,000 people. The most important of the Dutch possessions, though not the largest, is the island of Java, which has 35,000,000 people, and exports tea, rubber, tobacco, tin, copra, coffee, sugar, and cinchona (quinine). Most of these commodities are taken to the Netherlands and are then distributed to other countries. Rice is the chief food crop (Fig. 516). Batavia is the capital of Java.

Sumatra is much larger, but has fewer people. It produces tobacco and many tropical products. Near it are two small islands, Banka and Billiton, which have rich tin mines. Borneo is the largest island of the group. It is divided between the Netherlands and Great Britain. The Dutch also hold Celebes, part of New Guinea, and a large number of smaller islands, while the Philippines belong to the United States. The islands resemble one another in soils and climate, are rich in minerals, and abound in every kind of tropical product.

Review.—1. What regions are included in British India? 2. Where are the principal lowlands of India? 3. Give an account of the Dekkan.

4. Give the chief facts about rice production in India. What other grains are raised? 5. For what is teakwood used?

6. How is India governed? 7. Name the principal cities of India. 8. Name and locate the principal rivers and cities of Burma.

9. What are the products of Ceylon?

10. What name is given to the southern part of the Malay Peninsula? 11. State the location and importance of Singapore. 12. What are the products of Siam? Of French Indo-China?

13. What parts of the East Indies belong to the Netherlands? 14. What localities furnish much tin? 15. How does the population of Java compare with that of the Netherlands?

Fig. 517
Physical and Political
CHINA AND JAPAN
Scale of Statute Miles
0 100 200 300 400 500
505 MILES TO ONE INCH
Capitals: ⊙ Railroads:
ELEVATIONS IN FEET
OVER 15000
5000 TO 15000
2000 TO 5000
1000 TO 2000
500 TO 1000
SEA LEVEL TO 500
BELOW SEA LEVEL
Tropic of Cancer
Longitude East from 120° Greenwich
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Tokyo
Osaka
Kyoto
Yokohama
Nagoya
Sapporo
Hakodate
Calcutta
Bangkok
Hanoi
Rangoon
Singapore
Manila
Irkutsk
Semipalatinsk
Kirghiz Steppe
Lake Baikal
Khabarovsk
Petropavlovsk
KAMCHATKA
SAKHALIN
KARAFUTO
HOKUSHU
HONSHU
SHIKOKU
KIUSHU
CHOSEN
(KOREA)
MANCHURIA
OUTER MONGOLIA
DESERT OF GOBI
CHINESE TURKESTAN
TAKLA MAKAN DESERT
TIBET
Plateau of Tibet
CHINESE REPUBLIC
Yellow Sea
East China Sea
South China Sea
Sea of Japan
Sea of Okhotsk
PACIFIC OCEAN
FRENCH INDO-CHINA
SIAM
TONKIN
HAINAN
TAIWAN (FORMOSA)
PHILIPPINE ISLANDS (U.S.)
Bay of Bengal
ANDAMAN IS.
HONGKONG (Brit.)
Macao (Port.)
Kwangchow (Fr.)
Amoy
Foochow
Swatow
Wuchow
Changchow
Kiukiang
Hankow
Ichang
Chungking
Changsha
Siangtan
Nanchang
Wenchow
Ningpo
Chinkiang
Soochow
Wuhu
Hangchow
Kaifung
Singan
Lanchow
Chengtu
Batang
Lassa
Tali
Yunnan
Kuiyang
Kuilin
Liuchow
Pakhoi
Haiphong
Vientiane
Luang Prabang
Chiengmai
Mandalay
Bhamo
Myitkyina
Assam
Patna
Ganges
Himalaya Mts.
Kuen Lun Mts.
Altyn Tagh
Nan Shan
Tien Shan
Kara-nor
Koko Nor
Lob Nor
Turfan Depression
Gobi
Kirin
Changchun
Mukden
Newchwang
Antung
Dairen
Port Arthur
Kalgan
Chengting
Taiyuen
Shuntien
Weihaiwei
Tsinan
Tsingtau
KIAOCHOW
Gensan
Seoul
Chemulpo
Fusan
Pingyang
Hiroshima
Fukuoka
Nagasaki
Kagoshima
Kanazawa
Toyama
Niigata
Sendai
Otaru
Njkolsk
Aigun
Blagovyeshchensk
Dui
Manui
Korusakofu
Tsitsikar
Nerchinsk
Chita
Kaidalov
Kiakhta
Maimachin
Uliasutai
Kobdo
Sairussu
Urga
Urumtsi
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Kaifung
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Peking
Mukden
Kirghiz Steppe
Semipalatinsk
Lake Balkash
Ili R.
Tarim R.
Yellow R.
Yangtze R.
Si Kiang R.
Mekong R.
Irrawaddy R.
Brahmaputra R.
Indus R.
Ganges
Patna
Calcutta
Mouths of the Ganges
Rangoon
Bassein
Mandalay
Bhamo
Myitkyina
Assam
Himalaya Mts.
Kuen Lun Mts.
Altyn Tagh
Nan Shan
Tien Shan
Gobi
Kirin
Changchun
Mukden
Newchwang
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Dairen
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Hami
Aksu
Kashgar
Yarkand
Khotan
Soochow
Lanchow
Singan
Kaifung
Tientsin
Peking
Mukden

CHINA

524. Chinese Provinces.—In addition to China proper, the Chinese government claims authority over four provinces on the west and north: Tibet, Sinkiang, Mongolia, and Manchuria. All together these five regions are about half as large as North America.

Tibet is a high and mountainous plateau. The western part of the plateau is from 14,000 to 16,000 feet above sea level, and surrounding mountains rise much higher. It is very cold and very dry, and yet it contains many lakes. These have no outlets and are therefore salt. The eastern parts of Tibet are lower. The people and the cultivated lands are mainly in the drainage basin of the Brahmaputra River. Barley thrives there, and it is the chief grain and the most important food of the people. The herdsmen keep sheep, goats, and yaks, which can live on the scanty pasturage.

Fig. 518. Yaks

Yaks are much like cattle, but are usually black or white and have coats of long, soft hair. Yak's milk is rich, and is made into curds, which are a favorite food of the Tibetans. Ropes and tent coverings are made of the hair, the flesh is good for food, and the animals are used to carry loads, but not to draw wagons or plows. Thus the yak is as useful in this high, cold region as the reindeer is on the Arctic plains.

Cashmere wool, clipped from goats, is an important export, and brick tea is brought in from China proper.

The Tibetans are so isolated by mountains and so far from the main Chinese nation that they are but little controlled by the central government. Lassa is the capital and is regarded by the people as a sacred city. They try to shut out all foreigners from the place, and only a few have ever succeeded in entering it.

The province of *Sinkiang* includes Chinese Turkestan and other districts northwest of Tibet. It lies largely in the basin of the Tarim River, and is much lower than Tibet. Nearly all the province is a sandy desert, and the river ends its course in a salt lake. There are a few oases, where towns have stood for many hundred years. The most important of these are Yarkand and Kashgar. Through Sinkiang runs an ancient caravan route, by which China has carried on trade with western Asia and Europe.

Between China proper and Siberia is the vast province of *Mongolia*. It is occupied by the Desert of Gobi and by ranges of high mountains. The people are nomadic and devote themselves mainly to the keeping of camels, horses, and sheep. The Chinese call the desert "the Sea of Sand." A great trade route leads from northern China across Mongolia by way of Urga to Siberia.

Manchuria is on the Pacific Coast, east of Mongolia. It has extensive plains, is well watered, has good soil and a favorable climate, and produces large crops of beans and wheat. It has more people than all the three provinces already described. The Russians laid a railroad across it from Siberia to Port Arthur, where they built a great fortress, on ground leased from China. In a war with Russia in 1905, Japan captured this fortress, and these two countries now exercise much influence over Manchuria, though the province is considered as belonging to China. Mukden is the capital. Dairen, the chief port, is under Japanese rule.

Fig. 519. Coolies unloading tea at Hankow

steamers go 370 miles farther, and native boats, pulled in some places by means of ropes, by runners on the banks, reach a point 1750 miles from the ocean. Several large cities are on the Yangtze, and the adjoining country has a dense population.

The Hwang is the main river of northern China. Like the Yangtze, it rises in Tibet. After making a great bend northward in Mongolia, it crosses the plains to the Gulf of Pechili. It sometimes rises in terrible floods over these plains, and in 1887 no less than 1,000,000 people thus lost their lives. It is not strange that the people refer to it as "China's sorrow." It has shifted its course as much as 300 miles, and for a time it flowed into the Yellow Sea instead of the Gulf of Pechili.

Much of the interior of northern China is covered with a fine, yellowish soil known as *loess*. This is in places hundreds or even thousands of feet deep. Streams and rains have washed it and cut it into many hilly surfaces. As it is easily dug, and the country is dry, thousands of Chinese families cut out rooms in the banks and cliffs and use them for houses. This material is extensively washed away by the Hwang, or *Yellow* River, so called because discolored by the land waste that it carries.

525. China Proper.—China proper is less than half as large as the United States, but has about three times as many people. A complete census is not taken and we do not know the population accurately. The country is mountainous in the west, where it joins Tibet, and in the south, where it borders the Indo-Chinese region. The main lowlands are along the great rivers.

The largest of the rivers is the Yangtze, which to the Chinese is "the great river." It is 3100 miles long and is the main commercial river of China. Ocean vessels ascend to Hankow, 680 miles from the sea (Fig. 519). River

Fig. 520. Road cut in loess

526. Climate.—The climate of China and its provinces varies greatly in different sections, for the land lies across much of the temperate belt, and its southern parts are south of the Tropic of Cancer. Part of it is low and near the ocean, and the interior is high and far removed from the influence of the sea.

Little moisture can reach the high interior provinces, for most of their area is in the course of the westerly winds, which have moved across Europe and western Asia before they reach the provinces of China. The high wall of the Himalayas shuts off moisture derived from the Indian Ocean.

China proper and Manchuria have much more rain. All the southern parts are in the course of the monsoon winds that bring so much rain to India (Sec. 373). The south coasts often have as much as 100 inches of rainfall a year. The rainfall is less in the north, and at Peking the amount is about 24 inches.

Fig. 521. Great Wall of China; view along the top

Violent storms sometimes start in the East Indies and sweep the Chinese coasts, doing great damage. They are called *typhoons*, and are like the West Indian hurricanes.

527. People of China.—This section refers only to the people of China proper, who number more than 300,000,000. They have tilled the soil, built cities, and have been a civilized people from very ancient times. Until the middle of the nineteenth century they lived almost by themselves. The mountains and deserts of the western provinces shut them away from western Asia and Europe. Siberia was a wilderness until the Russians built a railroad through it. The Himalayas and other mountains separated the Chinese people from India, Burma, and Siam. On the ocean it took months for a European sailing vessel to reach them, and they did not allow foreigners to trade in their coast cities. They thought they had the best institutions, learning, and arts, and they did not want to have anything to do with other nations.

They knew how to make the finest silk goods, and fine china ware. They manufactured paper and published books long before Europeans invented printing. Instead of using type, however, they printed from blocks of hard wood, each containing the engraved words for a whole page. Twelve hundred years ago they built a canal 700 miles long which is still used. Two hundred years before Christ they began to build the Great Wall, which still stands to show their skill and industry. It extends more than 1200 miles from east to west, across hills and valleys, and has many watchtowers. It was constructed as a defense against Mongolian invaders from the north, and it served its purpose, for these wild enemies were horsemen, and a small Chinese army could defend the wall against them (Fig. 521).

While the Chinese people have thus been for many centuries capable of great achievements, they have been slow to adopt new customs. They show great deference to parents. They have an excessive reverence for the past, and do not readily change from the habits and mode of life of their forefathers. They are disposed to think the old way is best, and they also fear that they will lose their work when railroads take the

Fig. 522. Cutting off the queue, in China

place of porters and junks, and when machines replace labor by hand. And yet the Chinese people have always shown great skill and industry and they are coming gradually to appreciate the modern point of view and the ways of western nations.

Fig. 523. Chinese passenger wheelbarrow

Woman has been in a low position in China, and many girl babies were formerly sold or put to death, because they were not wanted. The feet of girls were bound in infancy, so that they could not grow, and many women could hardly walk. This is changed now, foot-binding is no longer lawful, and women begin to have advantages that they have not had before.

For nearly three centuries the Chinese men shaved part of their heads and allowed the rest of the hair to grow, to be braided into a "queue" or "pigtail," as a sign of submission to the ruling dynasty of emperors. But since the downfall of those emperors the queue has become very unpopular.

The homes of most of the people are poor, being made of bamboo or of dried mud. Little fuel is used, although China has much coal, and modern mines are in operation. Many of the people try to keep warm in padded cotton garments. The roads are very bad, and only recently have attempts been made to improve city streets, or to build sewers to carry off the filth of the cities. Goods are carried on the backs of men and animals, or pulled along the streams and canals in boats. Both goods and men are transported on a kind of wheelbarrow with a large wheel in the center. In recent years, however, several important railroads have been built, and others are under construction.

Fig. 524. Chinese house boat

528. Government.—About three hundred years ago the Manchu race, coming from the north, conquered China; and from that time on, until recently, the reigning sovereigns belonged to the Manchu dynasty. In modern times foreign nations, desiring Chinese trade, have gained permission to visit and settle in certain ports and in other cities. The Chinese have learned the value of foreign manufactures, such as cotton goods from our own country. Missionaries and teachers, especially from America and Great Britain, have introduced foreign ideas. The Manchu emperor was deposed in 1912, and a republic proclaimed; but there was long delay in adopting a constitution for the new government.

Fig. 525. Cells formerly used for examinations in China

Fig. 526. A Chinese school supplied with modern books

529. Agriculture.—To till the soil is thought highly honorable by the Chinese. The farms are small and are tilled with all the care usually bestowed on a garden. The Chinese farmers have long known that it is useful to change or rotate the crops. They save everything that can possibly be useful as a fertilizer; otherwise they could not have raised crops on the same ground for thousands of years. On the steep slopes they have made many terraces, as the farmers have in Italy and Germany, to prevent the washing away of the soil (Fig. 527). Even on the rivers, rafts are built and covered with soil for making gardens. Thousands of people have their little homes on such rafts, for every foot of space is precious where such a multitude must have homes and get a living.

The natural rainfall does not always provide moisture enough for the crops. In the plains, especially in central and southern China, water is laboriously raised from the rivers for irrigation, and for flooding the fields in raising the immense crops of rice that constitute a large part of the people's food. Two crops a year of rice and other products are commonly grown. The Chinese raise fish in the irrigating ditches and plant mulberry trees along the banks to feed silkworms. China is one of the leading countries of the world in the production of raw silk. This is largely because it has the cheap labor necessary for feeding the worms and unwinding the silk fibers from the cocoons (Sec. 449). Cotton is raised and is mainly consumed in home manufactures.

530. Tea.—China supplies a large part of the world's tea. The plant or bush needs a warm climate, but will endure some frost. It requires plenty of moisture, but the water must not stand around the roots. Hence the warm, well-watered hillsides in much of China are good ground for the tea crop. Three times a year the leaves are picked, dried in the sun, heated, rolled in the hand, and then baked over fires of charcoal. This process, which causes fermentation, makes "black tea." In making "green tea," the leaves are roasted without being fermented. Some of the tea is pressed into "bricks," for convenience in packing in small

Fig. 527. Terraces built to save the soil, northern China

Fig. 528. Harbor of Hongkong

compass, and in carrying a great distance on pack animals. The cheaper bricks are made from the poorer leaves and small twigs.

531. Forests and Minerals of China.—The country is so old and so populous that most of the trees were cut down centuries ago. For this reason there is but little wood for use, and the soil on the hills has been subjected to great washing and loss. There are some forests in southern China and in the outlying provinces, but the people have yet to learn the practice of forestry.

The coal and iron deposits of China are among the most extensive in the world. There are also rich deposits of copper, gold, silver, tin, mercury, lead, and antimony. Much tin and antimony are exported.

532. Chinese Cities and Routes of Trade.—China has not many good seaports. Shanghai is by far the most important. Behind it is the vast and fertile Yangtze Valley, with many cities along the Yangtze River. Hankow, on this river, is the most important interior city of China (Fig. 519). Waterways bring it into communication with many rich provinces. The principal railroad of China runs north to Peking, and a connecting line is under construction from Hankow to Canton. This will furnish a trunk line for traffic from north to south through the richest part of the country. Far in the interior on the Yangtze is Chungking, the commercial center of western China.

In northern China are Peking, the capital, and Tientsin, the port of Peking. The seaport is a large city, commercially more important than the capital. These cities are joined by railroad with Siberia, by way of Manchuria.

The port of Kiaochow, greatly improved as a German possession before the World War, has been returned to China.

Canton is the chief city of the southern regions. It is one of the large cities of China and is a center of the silk trade.

Not far from Canton is the island of Hongkong, which belongs to Great Britain, although the largest part of its population is Chinese. The seaport of Hongkong is one of the greatest in the world, and rivals Shanghai as a place for Chinese trade.

Review.—1. Describe the physical geography of Tibet. 2. In what ways is the yak useful? 3. Name the chief river and principal cities of Sinkiang. 4. What desert is in Mongolia? 5. Why is Manchuria an important province?

6. Describe the Yangtze River and give the facts about its navigation. 7. Give an account of the Hwang River. 8. What is the loess? 9. Explain the differences of rainfall in the different parts of the country.

10. How were the Chinese long separated from other peoples? 11. In what industries have the Chinese people shown skill?

12. What are the leading agricultural products of China? 13. What conditions are best for raising tea? 14. In what minerals is China very rich? 15. Draw a map of China showing the chief rivers and cities.

Fig. 529. A valley in central Japan. Much of Japan is mountainous

EMPIRE OF JAPAN

533. Physical Geography.—The Japanese Empire embraces a chain of islands extending from the south end of the peninsula of Kamchatka almost to the Philippine Islands. In the central part is the main Japanese group of islands, of which Honshu is the largest and most important. To the northeast are the Kuril Islands, of volcanic origin, and containing several active volcanoes. These islands are small and barren. The south half of the large island of Sakhalin has belonged to Japan since the close of its war with Russia in 1905. To the southwest is another chain of small islands, — the Nansei group, — and southwest of these is the island of Taiwan, or Formosa. The ancient country of Korea, occupying a peninsula of Asia, has been made a part of the Japanese Empire, and is now called Chosen.

The main islands are mountainous (Fig. 529), and are partly of volcanic origin. They contain several active volcanoes, one of which is Fujiyama, with an altitude of over 12,000 feet. Earthquakes occur frequently, and some of them are very destructive. The houses are built low, so that they may withstand the strain of the shocks.

The empire ranges in latitude from 22° to about 51° north. The southern part of Formosa is south of the Tropic of Cancer. Because of such differences of latitude the climate varies from tropical in the south to cold in the north. A warm ocean current, known as the Japan current, flows northward along the coast. The rainfall is heavy, and in the north and on the higher mountains there is much snow. The forests, by reason of the moisture, are luxuriant and show a great variety of trees. Much forest growth has been preserved because most of the surface is hilly or mountainous and there is less temptation to cut away the trees on steep slopes in order to cultivate the land.

534. People of Japan.—On the Japanese islands there are about 55,000,000 of the Japanese people, and their country is so small that only their industry and skill enable them to support themselves. They belong to the yellow, or Mongolian, race. They are somewhat like the Chinese, but are smaller in

stature, and more keen and active. Some are trained from infancy to be athletes, and they perform wonderful acrobatic feats. As in China, the civilization is very ancient, and the people kept foreigners away until modern times. The head of the nation is the Emperor (sometimes called the Mikado), whom the Japanese regard with feelings close to those of worship. There are two assemblies, or legislative bodies, one consisting of the nobility, and the other of representatives chosen by the people. Not all the people, however, are allowed to vote.

Fig. 530. Bamboo forest, Japan

Fig. 531. Bamboo baskets

The Japanese are intensely patriotic. They are very brave, and very willing to lay down their lives in battle. In the war with Russia, which closed in 1905, they showed great military skill. They had accurate knowledge of the country, provided ample food and pure water for their soldiers, showed skill in preventing disease and in surgical operations and nursing, and won great victories on sea and land.

535. Industries.—The Japanese have for many hundred years been skillful in many arts. Among these is the weaving of silk and the making of mattings. Their fine porcelain and glass ware are greatly admired, and are seen in the museums, art stores, and homes of people in Europe and America. The Japanese also excel all others in the art of lacquering. From the sap of a kind of sumac they make the lac, which is a varnish. They inlay woods in beautiful patterns, and then apply the lac, which when dried is given a high polish. As in India and China, many useful objects are made from bamboo (Fig. 531).

The progress of Japan during the past fifty years has been wonderful. The people are quick to learn, and they readily adopt or imitate the customs and industries of others. They have had a great desire to adopt the inventions and modern ways of Europe and the United States. They send many young men to foreign universities and engineering schools to study modern industries in the western

Fig. 532. Picking tea in Japan

world. When they return they can set up cotton-mill machinery and build ships or railroads as well as any other trained engineers. They also have large and well equipped universities of their own, and only a few of the professors in these schools are men from other nations.

There are more than 8000 miles of railway in Japan, a large mileage in view of the fact that the country is mountainous, and has few places that are as much as seventy-five miles from the sea.

Fig. 533. Street decorated for a festival, Yokohama

Rice is the main crop and, as in China and India, it is one of the principal foods. Barley and other grains also are raised. Japan produces a very large part of the world's supply of silk. Tea also is grown, as in China, India, and Ceylon. Some cotton is raised, but the main supply for Japan's numerous cotton mills is imported from the United States.

The waters about the islands abound in fish, and the fishing industry is very large, for the population must seek food of all kinds, when the area of tillable land is small.

Iron and coal are among the important minerals of Japan, and this is fortunate for the people, as they are establishing mills, building railroads, constructing ships, and engaging in commerce. The deposits of copper are large, and this metal also is of great value now that electrical power is much used. New manufactures, new openings for trade, new lines of steamships — all these are promoted with tireless energy by the wide-awake Japanese people.

536. Cities.—Tokyo, the capital, has over two million people. Yokohama is the port for Tokyo, and although much smaller than the capital city, it is the chief center of foreign trade. The principal Pacific steamships from Canada and the United States call at Yokohama. In September, 1923, these two cities and the surrounding region were greatly damaged by earthquake and fire. Osaka, the second city of Japan in population, has many cotton factories.

537. Chosen.—Chosen, formerly called Korea, occupies a large peninsula of the mainland of Asia across the Japan Sea from the island of Honshu. It was annexed to Japan in 1910, but for several years before that date Japan had exercised large influence in its affairs.

Most of the people of Chosen are engaged in agriculture. The most important crops are rice, wheat, beans, tobacco, and cotton. Live stock is raised chiefly for home use, and some whale fishing is carried on. The mineral wealth of the country includes copper, iron,

Fig. 534. Station at Vladivostok, terminus of the Siberian railroad

Fig. 535. Cotton warehouse, Bokhara

and coal, all of which are found in abundance, and also some graphite and mica. Seoul is the chief city.

Review.—1. What is the range of latitude in the Japanese Empire? 2. Name the more important islands and island groups. 3. Give facts about rainfall and forests. 4. Compare the Japanese with the Chinese people. 5. In what kinds of manufacture are the Japanese skillful? 6. What recent advances have they made? 7. Name the chief cities of Japan. 8. Where is Chosen, and what are its resources?

ASIATIC RUSSIA

538. Russia in Asia.—The former Russian Empire included Siberia, Caucasus, Turkestan, and other provinces, with a total area almost equal to that of South America and a population much smaller. After the World War these provinces declared themselves independent republics, but they soon fell again under Russian influence or control.

539. Siberia.—Siberia was once known as a cold, barren wilderness to which Russian convicts were sent for exile. Thousands of these people had committed no worse crime than to criticize the government, or in some way to seek the reasonable liberty for themselves and their fellow-Russians that the citizens of all well-governed countries have enjoyed for many years. It gradually came to be known that the Siberian country had good soils, much timber, and many minerals. The Russian government gained control of some of the Pacific coast of Asia, and built the Siberian railroad, which extends from Leningrad to Port Arthur and Vladivostok, a distance of almost 6000 miles (Fig. 534).

After the Siberian railroad was finished, the country through which it passes was settled by more and more people from European Russia. They found it profitable to raise wheat, rye, oats, and other crops, to keep live stock, and to open mines, because the products could now be carried to people who would buy them. Not only the products of Siberia, but tea from China and other goods go overland from eastern Asia to Europe.

Among the chief cities of the interior are Tomsk and Irkutsk, the latter near Lake Baikal, a large, deep body of fresh water.

The vast region of Siberia has been divided into several main divisions. These are Tiumen, Siberia, Yakutsk, Mongol-Buriat, and the Far East, each of which is in greater or lesser degree under control of the Russian government. Much of Mongolia is now largely under the influence of Russia.

540. Kirghiz, Turkestan, etc.—In Turkestan, Kirghiz, and Bokhara, semi-independent countries east of Caspian Sea, deserts and mountains occupy most of the land, and there are few cities. In this region is Lake Aral, which, like Great Salt Lake and the Dead Sea, is a body of salt water. The Russians have built a railroad southeast into the interior of Asia, with a branch leading westward to the frontier of Persia, and extending to the Caspian Sea. Some grain is raised, and the Russians have also promoted the raising of cotton in this region (Fig. 535), so that they need not import so much from the United States and other countries. The wool of sheep, goats, and other animals is woven by the natives into rugs, many of which are sold in the United States.

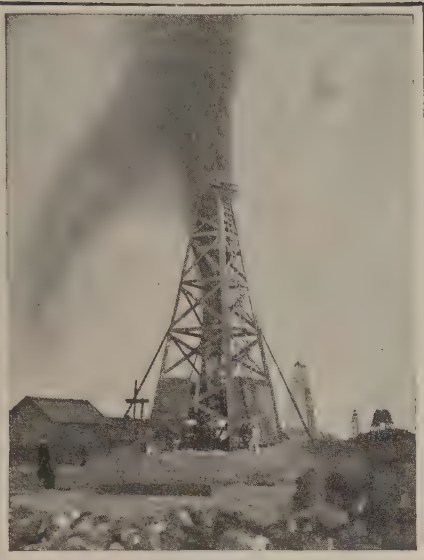

Fig. 536. Oil well, Baku, before the flow was brought under control

541. The Caucasus Republics.—In the region that lies south of European Russia, between the Caspian and Black seas, are a number of republics under Russian control, including Azerbaijan, Georgia, and Armenia (Fig. 501). The Caucasus Mountains run through the region from east to west. South of them the climate is suited to grapes, corn, cotton, and other products of temperate and subtropical latitudes.

A large amount of petroleum is obtained in a small district at Baku on the Caspian Sea (Fig. 536). Much of the oil is transported by rail to Batum on the Black Sea, and thence is taken by ships to many lands. It is also used as a fuel by steamers on the Caspian Sea and on the Volga River. Tiflis (Fig. 537), the largest city of the Caucasus region, is an ancient center of trade.

Review.—1. For what was Siberia formerly used? 2. What are its chief resources? 3. Give an account of the Siberian railroad. 4. Locate Lake Baikal and name a city near it.

5. Where is Lake Aral? What is its character? 6. Describe the lands near it.

7. In which republic is Tiflis (Fig. 501)? 8. What is the great industry of Baku?

Fig. 537. Tiflis, the capital of Georgia

ATLANTIC OCEAN
EUROPE
FRANCE
SPAIN
PORTUGAL
ITALY
Mediterranean Sea
Black Sea
Caspian Sea
TURKEY
SYRIA
ARABIA
PERSIA
EGYPT
LIBIA
ALGERIA
MOROCCO
TUNIS
Sahara
SOUTHERN TERRITORIES
TERRITORY OF THE NIGER
FRENCH SUDAN
FRENCH WEST AFRICA
ANGLO-EGYPTIAN SUDAN
ABYSSINIA
ITALIAN SOMALILAND
BRITISH SOMALILAND
FRENCH SOMALI COAST
NIGERIA
FRENCH GUINEA
IVORY COAST
GOLD COAST
LIBERIA
SIERRA LEONE
UPPER GUINEA
Gulf of Guinea
LOWER GUINEA
FRENCH EQUATORIAL AFRICA
BELGIAN CONGO
ANGOLA
SOUTHWEST AFRICA
NORTHERN RHODESIA
SOUTHERN RHODESIA
BECHUANALAND PROT.
UNION OF SOUTH AFRICA
KENYA
UGANDA
TANGANYIKA TERRITORY
INDIAN OCEAN
MOZAMBIQUE
MADAGASCAR
Channel
Kalahari Desert
Libyan Desert
Nubian Desert
Tropic of Cancer
Tropic of Capricorn
Equator
Suez Canal
Persian Gulf
Gulf of Aden
Paris
Marseille
Madrid
Barcelona
Lisbon
Gibraltar
Rome
Naples
Constantinople
Smyrna
Athens
Tiflis
Baku
Teheran
Aleppo
Damascus
Bagdad
Jerusalem
Port Said
Cairo
Suez
Alexandria
Siut
Keneh
Kharga
Assuan
Great Dam
Medina
Mekka
Port Sudan
Suakin
Berber
Khartum
Omdurman
Asmara
Massaua
Aden
Berbera
Harar
Adis Abeba
Obbia
Mogadisho
Kismayu
Nairobi
Mombasa
Zanzibar
Dar es Salaam
Tanga
Tabora
Kilwa
Kisiwani
Lourenço Marques
Beira
Quilimane
Mozambique
Tamatave
Tananarivo
Fianarantsoa
Diego Suarez
Tullear
Port Elizabeth
East London
Cape Town
Durban
Johannesburg
Pretoria
Kimberley
Mafeking
Windhoek
Swakopmund
Walfisch Bay
Angra Pequena
Port Nolloth
Mossamedes
Benguela
Elizabethville
Broken Hill
Livingstone
Salisbury
Bulawayo
Leopoldville
Stanleyville
Coquilhatville
Ponthierville
Brazzaville
Loanda
Kasanje
Matadi
Boma
Kabinda
Nyangwe
Kabalo
Albertville
Usumbura
Entebbe
Port Florence
Mt. Kenya
Mt. Kilimanjaro
Victoria Nyanza
Lake Tanganyika
Lake Rudolf
Lake Albert
Lake Edward
Lake Kivu
Lake Nyasa
Victoria Falls
Kafue R.
Zambesi R.
Kunene R.
Orange R.
Congo R.
Niger R.
Nile R.
Blue Nile
White Nile
Sobat R.
Shari R.
Benue R.
Volta R.
Senegal R.
Gambia R.
Juba R.
Tana R.
Rovuma R.
Limpopo R.
Kasai R.
Ubangi R.
Mbomu R.
Aruwimi R.
Makua R.
Kilimanjaro
Kenya
Ruwenzori Mts.
Stanley Falls
Stanley Pool
Kasai R.
Tsana L.
Chad L.
Rudolf L.
Albert L.
Kivu L.
Victoria L.
Nyasa L.
Tanganyika L.
Moero L.
Bangweulu L.
Ngami L.
Amber C.
Guardafui C.
Delagoa Bay
Lourenço Marques
Beira
Quilimane
Mozambique
Tamatave
Tananarivo
Fianarantsoa
Diego Suarez
Tullear
Mauritius (Br.)
Reunion I. (Fr.)
Comoro Is. (Fr.)
Aldabra I. (Br.)
Ascension I. (Br.)
St. Helena I. (Br.)
Annobon I. (Sp.)
St. Thomas I. (Port.)
Princes I. (Port.)
Fernando Po I. (Sp.)
Canary Is. (Sp.)
Madeira Is. (Port.)
Ifni (Sp.)
Funchal
Mogador
Agadir
Casablanca
Rabat
Fez
Tangier
Melilla
Oran
Algiers
Tripoli
Bengazi
Solum
Ghadames
Murzuk
Ghat
Gatrun
Ideles
Colomb-Bechar
Tugurt
Wargla
Biskra
Sfax
Susa
Tunis
Bizerta
Constantine
Tebessa
Sicily
Malta
Crete
Cyprus
Sardinia
Corsica
Austria
Hungary
Czechoslovakia
Poland
Germany
Rumania
Yugoslavia
Bulgaria
Timbuktu
Agades
Zinder
Kano
Sokoto
Zaria
Bauchi
Baro
Ibadan
Abeokuta
Abomey
Kumassi
Bamako
Wagadugu
Sikasso
Kayes
Segu
Timbuktu
Dakar
St. Louis
Bathurst
Bulama
Konakry
Freetown
Monrovia
Bingerville
Second Akkra
Lome
Porto Novo
Lagos
Asaba
Buea
Duala
Yaounde
Edea
Libreville
Gabun
Francheville
Kourassa
Zungeru
Abeshr
El Obeid
Kodok
Sennar
Khartum
Omdurman
Dongola
Karima
Wadi Halfa
Assuan
Siut
Keneh
Kharga
Suez
Cairo
Port Said
Jerusalem
Damascus
Aleppo
Smyrna
Athens
Constantinople
Tiflis
Baku
Teheran
Bagdad
Medina
Mekka
Port Sudan
Suakin
Berber

Fig. 539. Lifting water from the Nile, for irrigation, by means of jars on the vertical wheel at the right

AFRICA

	Area, Sq. Mi.	Population	Capital
Abyssinia	312,000	8,000,000	Adis Abeba
Liberia	36,800	1,500,000	Monrovia
Egypt	400,000	13,387,000	Cairo
British Possessions .	3,848,100	46,042,000	
French Possessions .	4,287,400	40,728,000	
Portuguese Posses. .	801,500	8,150,000	
Italian Possessions .	774,500	1,675,000	
Spanish Possessions	106,240	1,330,000	
Belgian Congo . .	947,200	15,400,000	Boma

Map Study.—1. Compare the coast lines of Africa and Europe. 2. How many degrees south of the Tropic of Capricorn is the Cape of Good Hope? 3. How many degrees does Africa extend north of the Tropic of Cancer? 4. From the map, estimate the part of the continent that is in the Torrid Zone.

5. Locate the Atlas Mountains; the Ruwenzori Mountains. 6. Locate the Sahara; the Libyan Desert; the Kalahari Desert.

7. What sea is between Africa and Asia? 8. Locate the Gulf of Aden.

9. Describe the course of the Nile; the Niger; the Congo; the Zambezi. 10. Where is Lake Chad? 11. In what respect is it like the Caspian Sea? 12. Locate Lake Tanganyika; Lake Nyasa; Lake Victoria.

13. What three groups of islands are west of Africa and north of the Equator? (See Fig. 350.) 14. Allowing sixty-nine miles for a degree of latitude, how long is the island of Madagascar?

15. What parts of Africa belong to France? To Great Britain? To Italy? To Belgium? To Portugal? (Fig. 350.) 16. What city is at the head of the Nile delta? At one of the mouths of the Nile? 17. Name three other important cities on the north coast. 18. What city is at the union of the White Nile and the Blue Nile? 19. Where on the east coast is Mombasa? Lourenço Marques? 20. Find the following cities of South Africa: Cape Town; Johannesburg; Kimberley. 21. Find Monrovia and Freetown on the west coast, and Leopoldville on the Congo. 22. Locate Walfisch Bay and name the European nation that controls it.

PHYSICAL GEOGRAPHY

542. Coast Line and Surface.—Africa is three times as large as Europe, and yet it has a shorter coast line. The outline is very regular, and there is not a single deep indentation like the Adriatic Sea or the Baltic Sea. Around almost the whole continent there is a narrow lowland, which in many parts is so hot and unhealthful that white men cannot live upon it. Back of this low coast strip the surface rises, and becomes a

ATLANTIC OCEAN
EUROPE
Alps
Bay of Biscay
Pyrenees
Danube R.
Black Sea
Caucasus Mts.
Caspian Sea
ASIA
Mediterranean Sea
Strait of Gibraltar
C. Spartel
C. Bon
Atlas Mts.
MADEIRA IS.
CANARY IS.
Gulf of Gabes
Below Sea Level
Gulf of Sidra
Suez Canal
Isthmus of Suez
Mt. Sinai
Arabian Desert
Red Sea
Persian Gulf
Wady Draa
Bojador
Libyan Desert
Below Sea Level
Nile
1st Cataract
2nd Cataract
3rd Cataract
4th Cataract
5th Cataract
6th Cataract
Nubian Desert
Tropic of Cancer
Sahara
Tummo Mts.
Tarso Mts.
C. Blanco
C. Verde
Senegal R.
Gambia R.
Niger R.
Niger Plateau
Kong Plateau
L. Chad
Shari R.
Bahr el Arab
White Nile
Blue Nile
Abara R.
Atbara R.
Gulf of Aden
SOCOTRA
C. Guardafui
Plateau of Abyssinia
Kuba Hills
Bight of Benin
Cameroon Mts.
C. Palmas
FERNANDO PO I.
Bight of Biafra
PRINCES I.
ST. THOMAS I.
Gulf of Guinea
Equator
C. Lopez
ANNOBON I.
Ogowe R.
Binue R.
Makua R.
Lake Albert
Mountains of the Moon
L. Rudolf
Mt. Elgon
Mt. Kenya
Ruwenzori Mts.
Aruwimi R.
Stanley Falls
L. Edward
L. Victoria
Kivu L.
Kirungu Mts.
Mt. Kilimanjaro
L. Tanganyika
Congo R.
Kasai R.
Lukuga R.
Lualaba R.
Kuango R.
Kwango R.
Kasai R.
Kuilu R.
Kuyuni R.
Kubanga R.
Kunene R.
Zambezi R.
Victoria Falls
Mushinga Mts.
L. Nyasa
Mt. Zomba
C. Frio
L. Ngami
Walfisch Bay
Tropic of Capricorn
Kalahari Desert
Nieuwveld Mts.
C. of Good Hope
C. Agulhas
INDIAN OCEAN
PEMBA I.
ZANZIBAR I.
MAFIA I.
ALDABRA I.
C. Delgado
C. Amber
COMORO IS.
Mt. Ajuder
Mozambique Channel
MADAGASCAR
MAURITIUS I.
REUNION I.
C. Corrientes
Delagoa Bay
C. Ste. Marie
ASCENSION I.
ST. HELENA I.
Fig. 540
Physical
AFRICA
Scale of Statute Miles
0 250 500 1000
750 MILES TO ONE INCH
ELEVATIONS IN FEET.
OVER 5000
2000 TO 5000
1000 TO 2000
SEA LEVEL TO 1000
LAND BELOW SEA LEVEL
Depths in Fathoms.
0 to 100
100 to 1000
1000 to 2000
over 2000
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20° Longitude West 10° from Greenwich 0°
10° Longitude East 20° from Greenwich 30°

Fig. 541. A snow-covered peak of the Ruwenzori Mountains, near the Equator in Africa

plateau over most of the continent. Much of the interior plateau is from 2000 to 4000 feet in altitude, and all the great rivers descend from the upland to the coastal lowland by a series of rapids or falls. Above these falls the larger rivers are navigable for hundreds of miles into the interior of the continent.

Africa has fewer high mountains than any other continent except Australia. The range known as the Atlas Mountains extends through northern Africa about 1400 miles, from the Atlantic Ocean to the eastern part of Tunis. The highest point in these mountains has an altitude of nearly 15,000 feet. The Ruwenzori Mountains are a short, high range in central Africa, whose tops are covered with snow and glaciers, the highest peak rising to 16,600 feet (Fig. 541). Eastern Africa has a highland that extends from the Zambezi River to the Red Sea. Upon it, near Lake Victoria, is the volcanic peak Kilimanjaro, rising to 19,720 feet. Abyssinia occupies a lofty plateau, above which volcanic peaks reach to a height of about 15,000 feet above sea level. But Africa has no mountain range equal in size to the Himalayas, the Andes, or the mountains of western North America.

543. Rivers and Lakes.—Africa has four great rivers. The longest of these is the Nile, which rises in the region of the great lakes of east-central Africa, and flows northward to the Mediterranean. On the way, it receives the Blue Nile, which descends from the Plateau of Abyssinia on the east. The Nile is 3700 miles long. Its headwaters are in the region of large rainfall along the Equator and in Abyssinia, and the supply of water is so great that it flows for hundreds of miles through a desert and enters the sea as a large stream.

The Congo River is somewhat shorter, but has a still larger volume of water. Some of its headwaters are near the sources of the Nile, but it flows westward, and hence, all the way to the sea, is in a region of plentiful rain, and receives large tributaries. Its falls are below Leopoldville. Above that place it is navigable for 1000 miles, and steamboats traverse also many of its larger tributaries. From the lower part of the river, which is navigable, a railroad has been built around the falls to Leopoldville. From the mouth of the Congo, therefore, freight may be carried, first by boat, then by rail, and again by boat, to the interior of the continent.

The Niger is the great river of that part of western Africa north of the Equator. It flows northeast for a long distance, and then turns to the southeast and finally enters

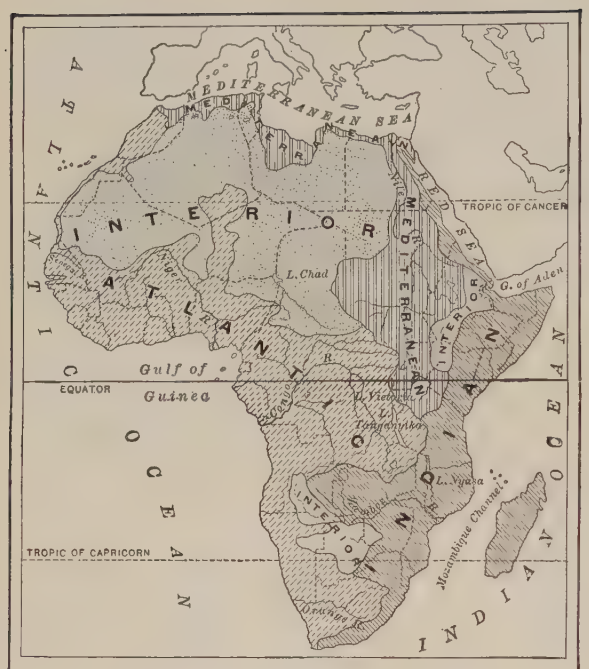

Fig. 542. Drainage basins of Africa

the Gulf of Guinea. The Niger is navigable in most of its course, but rapids at several points prevent the passage of steamboats from one part to another.

The Zambezi is the principal river of southern Africa. It rises near sources of the Congo, and flows eastward to the Indian Ocean. In the course of the Zambezi are the Victoria Falls (Fig. 543), which are nearly three times as high as Niagara.

In the highlands of east-central Africa are several lakes which compare in size with the Great Lakes of North America. The largest are Victoria, Tanganyika, and Nyasa. Their waters are fresh, and finally reach the sea through the Nile, Congo, and Zambezi.

South of the Sahara is Lake Chad. It is fed by rivers but has no outlet. It varies in size from 10,000 to 20,000 square miles, because it is in a region which has much rainfall during part of the year, and very little during the remainder. The lake is shallow, and during the dry season so much water disappears by evaporation that much of the lake bottom is laid bare.

544. Climate.—Central Africa lies along the Equator, and we have learned (Sec. 367) that the equatorial region usually has heavy rains. It is a region of intense heat and much evaporation, and where the air rises and is chilled the rainfall is abundant. As the belt of equatorial calms passes back and forth over this part of Africa each year (Sec. 368), there are two seasons when the rainfall is heavy.

Both north and south of this region are belts of land which during a part of the year are under a vertical sun in the region of equatorial calms, and at other times are subject to the trade winds. Thus the Sudan in Africa, lying between equatorial Africa and the Sahara, is well watered in our northern summer, but in our northern winter is traversed by the northeast trades, which blow far across Asia and Africa, and are dry winds. In the Sudan is Lake Chad, which is much larger during and just after the rainy season than it is during the dry season.

Fig. 543. Victoria Falls on the Zambezi River

The greater part of northern Africa is always in the course of the northeast trade winds, and hence is a desert (Fig. 367). This is true of the Sahara, of the Libyan Desert, and of Egypt except where it is irrigated. The Sahara extends westward to the shores of the Atlantic, because the winds come from the land and not from the water. Morocco, Algeria, and Tunis have more rain than the regions to the southward, especially in the winter, for at that time of the year these countries are in the belt of the westerly winds.

Fig. 544. Lion

Fig. 545. Hippopotamuses, mother and young

Southern Africa is across the track of the southeast trade winds. Hence the east coast is well watered, but the interior and the west coast are for the greater part dry. The Kalahari Desert is in this part of the continent.

As a whole, Africa is more in the tropics and has higher temperatures than even South America. It is drier also, because it is mostly a plateau and has no great mountain ranges, like the Andes, to condense the moisture brought by the winds.

545. Forests and Animal Life.—As the climate of most of Africa is either hot or subtropical, the vegetation is mostly such as is found in warm countries. The largest trees and heaviest forests are in the hot, rainy region near the Equator, especially in the basin of the Congo River. These forests, like those of the Amazon, are tangled and dense, with trees, shrubs, and vines, which shield most of the ground so completely that the sun's rays do not reach it.

North and south of this forest belt are *savannas*, or grasslands, with trees in the river valleys and reeds in the marshes. Trees do not flourish in the savannas, because rain falls only part of the year, by reason of the northward and southward movement of the equatorial calm belt. They are like the llanos of Venezuela and the campos of Brazil (Sec. 314). In the deserts of the trade wind belts are many oases with groves of date palms, which supply an important article of food. In the Mediterranean belt, which is more temperate, the vegetation is much like that of southern Europe, including palms, oaks, the olive, and the vine.

Many large wild animals are found in Africa, such as the elephant, rhinoceros, giraffe, leopard, lion (Fig. 544), and hippopotamus (Fig. 545). Camels are much used as beasts of burden in the deserts of northern Africa. The quagga and zebra, animals of the horse family, are numerous in the grasslands. Among other African animals are apes, chimpanzees, gorillas, baboons, and monkeys. In the tropical forests, as in those of other continents, there are many venomous reptiles, and many birds with brilliant plumage. The ostrich of southern Africa is raised for its feathers. Ants are numerous and build mounds ten or fifteen feet high. The white ants destroy almost anything made of wood.

Fig. 546. Zulu warriors, negroes of southern Africa

Review.—1. What is peculiar about the great rivers of Africa? 2. Where are the sources of the Nile? The Congo?

3. Why does the Sudan have a wet and a dry season each year? 4. Where are the trade wind deserts of Africa? 5. Why is one so much larger than the other? 6. What is the vegetation of the African savannas? 7. Why do they have few forests? 8. What are the principal wild animals of the continent?

PEOPLE AND HISTORY

546. The People.—The countries along the Mediterranean are occupied almost entirely by people of the white race. Some of them are called Berbers. They have lived in North Africa since ancient times. They are a wandering or nomadic people, and inhabit the mountain districts. Others are Arabs, or Moors, descendants of the men who, 1200 years ago, overran north Africa and conquered it for the Mohammedan faith. It was then and in the period following that the Moors crossed the Strait of Gibraltar, and ruled much of Spain (Sec. 458). The Mohammedans have planted their faith even south of the Sahara, and about a third of the people of Africa are believers in their prophet. There are some Jews also in the Mediterranean parts of Africa, and some who hold to ancient forms of Christianity. There are a few Italians, Frenchmen, and other Europeans, especially in the cities along the coast.

Central and southern Africa have always been the home of the black, or negro, race (Fig. 546). There are innumerable tribes of them, and the white man found most of them living in dense ignorance and darkest savagery. For several hundred years the white foreigner only made these conditions worse, for he came to Africa for little else than to hunt down the negroes in the forest, lead them in gangs to the seacoast, shut them up in terrible confinement in slave ships, and sell them into bondage in America and other lands. If he found them making slaves of one another, offering human sacrifices, killing a chief's wives after his death, or shooting their enemies with poisoned arrows, he had no excuse for finding fault with them, for he treated them worse than they treated one another.

Great changes have been made within the last fifty years, for civilized nations no longer sanction the slave trade. The natives are being kept in order by foreign powers, and many of them are learning how to labor. Missions and mission schools are teaching them the lessons of civilized life. It is not easy for some of the natives to learn to work, for they live in a warm region where they can get along with little clothing and shelter, and where the forest provides food.

Fig. 547. Kraal, or village, of negroes in southern Africa

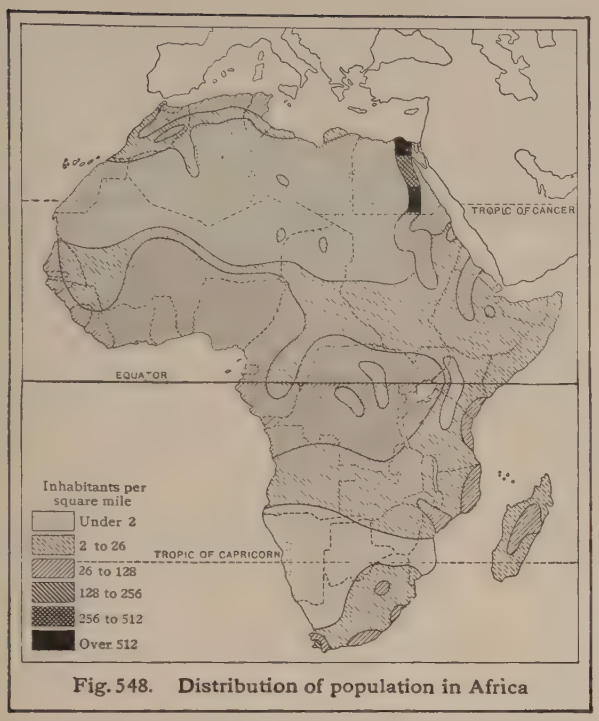

Fig. 548. Distribution of population in Africa

For more than 3000 years northern Africa has been known to history, but central and southern Africa have been largely unknown until within sixty years. Hence Africa has been called the "dark continent." There are several reasons why it has been backward. The coast is regular, and has few good harbors. The coast lands are low, hot, and so unhealthful that the region is called the "white man's grave." The rivers are interrupted by falls, so that boats cannot go from the sea to the interior. Unlike America, with its small original population, Africa had many millions of savages, ready to attack foreigners who ventured into her wild forests or over her savannas and deserts. Until recent years the white man went to Africa for slaves, and for ivory supplied by the tusks of elephants, and for little else.

547. Exploration.—The entire Mediterranean and Red Sea coasts were known by the people of Asia and Europe long before the time of Christ. The early narratives of the Bible have much to say about Egypt. The Phœnicians and the Greeks had colonies on the southern shore of the Mediterranean from Egypt to Gibraltar. They had some commerce in ivory and ostrich feathers, which must have come from the interior. But Africa beyond the Sahara was little known to the ancients, who called it Ethiopia. It is believed by some that one of the ancient navigators sailed around Africa. If this is true, the people had lost the knowledge of it, for when Vasco da Gama, a Portuguese navigator, in 1497 sailed around the Cape of Good Hope, he was regarded as having made a great discovery. He went to India and returned safely to Lisbon in 1499.

In the last century two British explorers more than any others made the "dark continent" known to the world. The first was David Livingstone, a Scotchman, who went to southern Africa as a medical missionary in 1840, and worked as a missionary and explorer until his death in 1873. He learned much about the Zambezi and the region of the great lakes at the sources of the Nile and Congo. The other was Henry M. Stanley, who was sent by a New York newspaper in 1869 to find Dr. Livingstone. He made great discoveries in central Africa, especially in the Congo basin.

548. The Cape-to-Cairo Railroad.—All the European countries that own parts of Africa are active in building railroads. One great plan will be described here and reference made to others in our study of African countries. The British control the greater part of the basin of the Nile. They have already built a railroad from Alexandria and Cairo to Khartum and beyond. They also control much of eastern and southern Africa. They have built a railroad from Cape Town 2000 miles northward, far across the Zambezi River. They expect to join these two lines and make the "Cape-to-Cairo" railroad, nearly 7000 miles long. New lines are under construction by the British and others, to connect this road with the shores of the Indian and Atlantic oceans.

549. Partition of Africa.—Europe is made up of large and small countries, most of which are independent. In Asia large sections are controlled by European nations, but there are also important countries, as Japan and China, that are self-governing. With but few exceptions, the countries of the Western Hemisphere are republics. Canada is a part of the British Empire, but its people are as free as those of any republic. Africa differs from the other continents by reason of the fact that nearly all of its territory has been divided among European powers. Liberia, Abyssinia, and Egypt are the only countries that are independent.

The countries that control most of Africa are Great Britain, France, Belgium, Italy, and Portugal. All these are small countries with a dense population. Portugal has had her African colonies since the days of early discovery, but the others have taken possession of parts of Africa within recent times. One reason for this "partition," or dividing, of Africa is that the European powers want land where some of their people can find new homes.

Another reason is that they want more raw materials for the factories at home. They hope to raise much cotton, for example, and not to be compelled to buy so much cotton from the planters of our southern states. They desire to find precious metals, as the British have found gold and diamonds in South Africa. They seek the forest wealth, just as Belgium makes much money from the rubber of Congo forests.

They also desire new markets for the steel, textiles, and other things which are made in European factories. If they can train the African negro to work, and produce things needed in Europe, and at the same time to desire things made in Europe, then commerce will be established and both the Europeans and the Africans will be benefited. It is, therefore, the growth of European nations and the desire for expansion of territory and trade that have led to the partition of Africa.

The interest of European nations in owning land in Africa became so strong that in 1885 a conference was held in Berlin, and many questions were settled, which helped to a peaceful division of the continent, by treaties. Germany soon gained nearly one tenth of Africa; but in the World War she lost most of Cameroon and Togo to the French, a small part of East Africa to the Belgians, and the rest of her African colonies to the British.

France and Great Britain together hold three fourths of all African territory. On the whole the British possessions are of the greater importance because of good soils and favorable climate. Among the regions in the British Empire are South Africa, Rhodesia, East Africa, and much of eastern Sudan. In western Africa, Nigeria on the lower Niger, Gold Coast, and Sierra Leone are under British control (Fig. 350).

France has Algeria and Tunis, on the Mediterranean, most of Morocco, most of the Sahara, French West Africa, Dahomey, French Equatorial Africa, and the island of Madagascar. Italy holds Eritrea on the Red Sea, Italian Somaliland, and Tripoli or Libia on the Mediterranean. Portugal retains from

Fig. 549. Algiers, the chief city of French Africa

its provinces held by right of discovery, Mozambique, Angola, and Portuguese Guinea. Spain holds two small territories on the west coast, and controls part of Morocco. Belgium holds most of the Congo basin.

Review.—1. What races of people are found in northern Africa? 2. Give an account of the slave trade. 3. What improvements are taking place in the life of the negro tribes? 4. Why has Africa been a backward continent?

5. What nations explored the coasts of Africa in ancient times? 6. Give the name of the first modern sailor who went around the Cape of Good Hope to India, and the date. 7. Give an account of David Livingstone; of Henry M. Stanley.

8. Describe the Cape-to-Cairo railroad.

9. What is meant by the partition of Africa? 10. What are the principal parts of Africa belonging to Great Britain? To France? To Portugal? To Belgium? 11. For what reasons have European nations been eager to possess African territory?

Fig. 550. Pyramids in Egypt

COUNTRIES OF AFRICA

550. Egypt. — Civilized people lived in Egypt and maintained a strong kingdom for thousands of years before the time of Christ. Much of their ancient history has been learned in recent years by scholars who have translated the inscriptions and other writings that have been discovered. These have been preserved in Egypt, an arid country, while they would have been destroyed in a land with a moist climate and severe changes of temperature. The Egyptians took great care in embalming and wrapping the bodies of the dead, which are known as mummies. The mummies of some of the ancient kings have been discovered and identified.

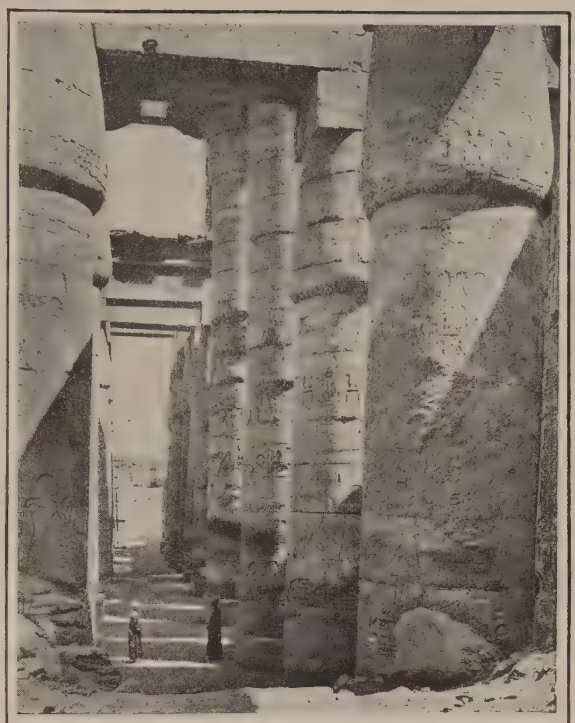

Fig. 551. Columns in the temple at Karnak, Egypt

The pyramids of Egypt, built of blocks of stone, were erected as burial places for kings (Fig. 550). The building of such pyramids required the work of thousands of men for many years. The largest of them are about 450 feet high. Temples with huge columns were made in the same way (Fig. 551). Single blocks of stone of great size were quarried, carved with inscriptions, and set up as monuments. These are known as obelisks, and some have been removed and set up in foreign cities, as in Rome, in London, and in Central Park, New York. The Sphinx is a giant statue carved out of rock.

Egypt, after centuries of Turkish misrule, became in 1882 a nearly independent monarchy, but for many years it was under British influence. By British aid the people prospered, because they were justly taxed and were taught to use good methods of tillage.

Fig. 552. Part of the Assuan dam

In 1922 Egypt was declared a sovereign state with its own king, but Great Britain continues to insure order and to protect the Suez route and neighboring colonies.

Egypt is several times as large as the British Isles, but most of it is a desert like the Sahara. The Nile flows through it from south to north, and for thousands of years the people have lifted or pumped the water out over the flood plain and the great delta at its northern end (Fig. 539). About 12,000 square miles are thus cultivated, and this area is the real Egypt. When the rains come along the upper Nile, and particularly in the Plateau of Abyssinia, the river rises many feet and floods the lowlands, giving them water and leaving a cover of fine, rich soil. Under British direction a dam about 6400 feet long was built at Assuan (Fig. 552), setting back the water and forming a lake or reservoir 200 miles long. This water is distributed over the fields, and increases the amount of land that can be cultivated.

Two or three crops are raised each year, and Egyptian agriculture is now very prosperous. Many crops of both temperate and hot climates are raised, including a large amount of wheat and other grains. The Egyptian cotton is of excellent quality, and the country stands next to the United States and India in the export of this fiber. Some Egyptian cotton is used in American mills for making special kinds of goods, but most of it goes to England.

There are more than 13,000,000 people in Egypt, and more than nine tenths of them are of the Mohammedan faith. Cairo (Fig. 553), at the head of the Nile delta, is the capital, and is the largest city in Africa, with a population of more than 750,000. In its museum is a remarkable collection of Egyptian antiquities. Its streets are full of quaint Oriental people of many kinds. Its dry and healthful air and its historical interest attract people of many lands, who make it a resort for the winter months. Alexandria still remains the chief seaport of Egypt, as it was in ancient times.

The Suez Canal extends from Port Said, on the Mediterranean, 103 miles to Suez at the head of the Red Sea. Of this distance true canals cover 76 miles, and lakes 27 miles. The canal was completed in 1869 after ten years of work. It is 35 feet deep, and accommodates all but very large ocean vessels. Before it was dug, Mediterranean commerce was much less important than now, for all European ships bound for the East were compelled to go around the Cape of Good Hope. Now they may go direct from London and other European ports by the Suez route to Bombay, Calcutta, Singapore, Hongkong, and the ports of Australia and New Zealand. In normal times about 5000 ships pass through the canal each year, with a tonnage of 20,000,000. The majority of the ships are British, but there are many under the French, Dutch, Japanese, Italian, and other flags.

Fig. 553. A street in Cairo

Fig. 554. Camel ready for a caravan journey

Fig. 555. Date palms, Algeria

551. Tripoli, or Libia.— Tripoli was formerly part of the Turkish Empire, but is now controlled by the Italians, who have renamed it Libia. The country has a long shore line on the Mediterranean, but is mainly a desert with a scattering population of Berbers, Arabs, Jews, and desert tribes. The chief city is Tripoli. The harbor is poor and the approach difficult. The sands and shoals of this part of the Mediterranean were dreaded by ancient seamen, and navigation is still dangerous. Along this shore the Greek sponge divers come with ships to gather sponges from the sea bottom.

In the deserts of Libia and in other parts of northern Africa a plant known as esparto grass is found. It has strong fibers. The stems are gathered, bound into huge bundles, and carried by camels to the sea, where they are put on ships and sent to England for making paper.

Tripoli has always been a center for the caravan trade. The trails reach across the Sahara to Timbuktu, Lake Chad, and all parts of the Sudan country. Some caravans are small, and some have thousands of camels with their drivers and guards, and carry goods having a value of hundreds of thousands of dollars. A caravan journey across the Sahara takes several months, and is full of danger, for bands of robbers are common in the desert. They know where all the wells and springs are, and often exact tribute from passing caravans even when they do not plunder them. Camels (Fig. 554) are the only animals that can carry burdens across the desert, because they can go five days or more, if necessary, without drinking. Each animal carries a load of about 300 pounds, and a day's march lasts sixteen hours.

The caravans bring from central Africa or the Sudan region, ivory, ostrich feathers, and skins, and carry back to the natives various products of Europe, such as cloths of cotton and wool, beads, paper, drugs, and sugar. The largest item is cotton goods from Great Britain. The caravan trade is not so large as it was, for railroads are being built in the countries south of the Sahara.

552. Tunis and Algeria.— Tunis and Algeria are under the control of France. They are more progressive countries than Tripoli. There are more railroads in these countries than in most parts of Africa, and there are thousands of miles of telegraph and telephone lines. Tunis and Algiers are the two capitals. They are well-governed cities, and are visited every winter by many Americans and other tourists. Much wheat is raised in Algeria and sent to France. Barley, oats, and corn also are large crops. Grapes and many tropical fruits, such as oranges, bananas, figs, olives, and dates (Fig. 555), are raised. Much wine is made and exported. Cork oaks yield an important export of cork bark. Esparto grass is gathered and exported, as in Tripoli. Sheep and other live stock are kept.

Fig. 556. Nile steamboat landing, at Khartum

553. Morocco.—Morocco has been until recently an entirely independent country, ruled by an absolute monarch called the Sultan. Its resources are like those of other north African countries, but most of its people live in ignorance and barbarism, and it is not yet an orderly or safe country. France has recently gained some control over most of the country, and may in time give Morocco as good government as Algiers and Tunis now have. Spain controls a small part of Morocco. Tangier, in an "international zone," is the principal city and seaport.

554. Sudan Countries and Abyssinia.—The Sudan is the region extending across Africa, south of the Sahara, from the Atlantic Ocean to Abyssinia and the Red Sea. On the south are the Gulf of Guinea and the watersheds between Lake Chad and the Congo River system. As we have learned (Sec. 544), it is intermediate in heat and rainfall between the tropical forests and the Sahara. Many of the negroes of the Sudan, west of Lake Chad, belong to the Hausa tribes, which are among the best and most prosperous people of the African black race.

France governs the central and much of the western part of the Sudan. In the west the chief center for trade between the Sudan and the Sahara is the ancient city of Timbuktu on the northern bend of the Niger. It is the center of many caravan trails, and the French plan to connect it by a railroad with their possessions in northern Africa. On the Gulf of Guinea are Nigeria and the Gold Coast, under British rule, and Dahomey and the Ivory Coast, under French rule. These are tropical countries with a hot climate, unhealthful near the coast, but with large resources of mine, forest, and field. The Gold Coast produces more cacao than any other country in the world.

In the western part of the Sudan are the small republic of Liberia and the British colony and protectorate of Sierra Leone. Liberia was founded as a home for freed American slaves. All industries are in a backward state. Monrovia is the chief city. Sierra Leone exports palm oil and kola nuts. Freetown is the greatest seaport in west Africa.

East of French Equatorial Africa is Anglo-Egyptian Sudan, which nominally belongs to Egypt and Great Britain, and is being developed under British control. The capital is Khartum, on the Nile (Fig. 556). The fierce natives were subdued by a British-Egyptian army in 1898, and order was established, opening the way for agriculture and civilized life. The Cape-to-Cairo Railroad (Sec. 548) has been finished some distance south of Khartum, and a branch line extends to the Red Sea.

To the east is Abyssinia, a region of plateaus and mountains, which still remains under a native ruler. Most of the inhabitants accept an ancient form of Christianity. The country has many mineral and other resources, but it has made little progress in modern methods of industry.

555. Countries along the Equator.—Among the countries crossed by the Equator are French Equatorial Africa, Belgian Congo, Uganda, and Kenya, the two last named being British possessions.

Following the journeys of Livingstone and Stanley, there was new interest in the Congo region, and the Berlin Conference in 1885 agreed that the Congo Free State should be

formed, and placed under the care of the King of Belgium. In 1908 it was formally annexed to the kingdom of Belgium and is now known as the Belgian Congo. Railroads and steamboats, traders and missionaries, have done much to open this tropical forest, and to improve the condition of its native negro tribes. A railroad runs around the falls of the lower Congo, and, above these, boats can go hundreds of miles on the great river and its tributaries (Fig. 557). Palm nuts are an important product. Much ivory (Fig. 558) has been obtained here and carried out to all parts of the world, both by the river and by caravan across the Sahara, but the supply is decreasing. Other products are rubber, white copal, cacao, coffee, tobacco, copper. The largest import is cotton goods, showing that the native negroes, of whom there are many millions, are learning to wear clothes.

Fig. 557. Steamboat on the Congo River at Leopoldville

French Equatorial Africa and the former German protectorate of Cameroon are northwest of the Belgian Congo, and have similar resources.

British colonies in eastern Africa extend from the Belgian Congo eastward to the Indian Ocean. In the northern parts are some of the sources of the Nile. The region includes Uganda and the colony of Kenya, with Mombasa the chief seaport. A railroad has been built from this city to the shores of Lake Victoria.

Fig. 558. Arab trader buying ivory in central Africa

South of the region just described is Tanganyika Territory, the part of German East Africa taken by Great Britain in the World War. It has millions of native people, a great variety of tropical products, a railroad from lake to ocean, and is being developed by European money and skill. Off the coast are the island and city of Zanzibar, which have long been under British control.

556. Countries of Southern Africa.—Portugal has colonies both on the west and on the east coast of southern Africa. In the eastern colony there is valuable territory along the Zambezi River, and there are two important ports, Beira and Lourenço Marques.

Most of the richer parts of southern Africa are under the British flag. The oldest towns are in the province of Cape of Good Hope, which was first settled by the Dutch and afterward occupied by the English. Then many of the Dutch, or *Boer* farmers, as they were called, " trekked," that is, they moved on to the north, or into the interior. They founded the Orange Free State and the Transvaal Republic. But when much gold was discovered in the Transvaal, many British and

Fig. 559. Cape Town, South Africa

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other gold seekers went in and there were disputes that finally led to the Boer War and the conquest of both republics by Great Britain. They are now provinces in the Union of South Africa, which has a government somewhat like that of Canada. The other two provinces of the Union are Natal and Cape of Good Hope. Natal is a province on the east coast with Durban as its seaport. The principal city and seaport of Cape of Good Hope is Cape Town (Fig. 559).

To the north, Rhodesia, named for Cecil Rhodes, who did much to develop South Africa, stretches northward to Belgian Congo and East Africa.

Southwest Africa, a former German colony, has been placed under the control of the Union of South Africa. It is largely a desert region, with a small population.

South Africa produces grain, and supports many sheep and cattle. A large amount of wool is exported, and there are many ostrich farms (Fig. 560). Gold is mined near Johannesburg (Fig. 561) in the Transvaal, and this locality is by far the greatest gold producer of the world.

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Fig. 560. Ostriches, mother and young

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Fig. 561. A gold mine at Johannesburg, South Africa

Fig. 562. Bottom of a diamond mine, Kimberley

At Kimberley in Cape of Good Hope are the largest diamond mines in the world. The gems are dug in a rough state out of masses of partly decayed volcanic rock (Fig. 562). The native laborers are watched and searched to see that they do not steal these precious stones. When sold, most of the diamonds go to Antwerp or Amsterdam to be cut and polished, after which they find their largest market in the United States.

Fig. 563. Funchal, the seaport of the Madeira Islands

557. African Islands.—The Madeira (Fig. 563) and Cape Verde Islands (Fig. 350) belong to Portugal, as do also the Azores, but the last are too far away to be called African islands. St. Helena is a small island off the southwest coast, chiefly known as the place to which Great Britain exiled Napoleon Bonaparte several years before his death. The Canary Islands belong to Spain.

The largest of African islands is Madagascar. It is larger than France or Germany, and is under French rule. It has a population of about 3,000,000, mostly natives descended from the Negro and Mongolian races (Fig. 564). Agriculture and cattle raising are the main industries, but the island has graphite and other minerals.

The islands of Reunion and Mauritius, in the Indian Ocean, are ruled by France and Great Britain respectively.

Review.—1. What are some of the great architectural works of the ancient Egyptians? 2. How is Egypt now governed? 3. How has the agricultural capacity of the country been increased? 4. Give an account of the Suez Canal. 5. Describe the caravan trade. 6. Name the countries of northern Africa. 7. What countries belong to the Sudan region? 8. How far south from Cairo has the Cape-to-Cairo Railroad been built? 9. What facilities for transportation are found in the Belgian Congo? 10. What bodies of water are joined by the chief railroad of British East Africa (Fig. 538)? 11. Give the history of German occupation in Africa; of Dutch occupation in southern Africa. 12. Name the chief seaport of Cape of Good Hope. 13. Where are the chief gold and diamond deposits of South Africa? 14. What are the other important products of South Africa?

Fig. 564. Water carriers, Madagascar

CHINA
BRITISH INDIA
Hanoi
Hongkong
FORMOSA
FRENCH INDO-CHINA
HAINAN
Laoag
LUZON
PHILIPPINE ISLANDS (To U.S.)
Manila
SIAM
Bangkok
South China Sea
Gulf of Siam
Saigon
PALAWAN
Iloilo
Cebu
Malay Peninsula
Sulu Sea
MINDANAO
SULU ARCHIPELAGO
BRUNEI
SARAWAK
Celebes Sea
Kuching
Singapore
FEDERATED MALAY STATES
Aclin
SUMATRA
BORNEO
Palembang
Banjermasin
Batavia
Samarang
Java Sea
Sunda Strait
Surakarta
Surabaya
MOLUKKA IS.
CELEBES
Makassar Strait
Molukka Passage
EAST INDIES (Dutch)
Banda Sea
TIMOR
Arafura Sea
Torres Strait
Port Moresby
NEW GUINEA
BISMARCK ARCHIPELAGO
TER. OF PAPUA (Comm. of Aus.)
(To Com. of Aus.)
Cape York
Port Darwin
Darwin
Gulf of Carpentaria
Kimberley
NORTHERN TERRITORY
Great Sandy Desert
Northwest Cape
QUEENSLAND
Rockhampton
Sandy Cape
Brisbane
AUSTRALIA
WESTERN AUSTRALIA
Great Victoria Desert
SOUTH AUSTRALIA
Perth
Fremantle
Cape Leeuwin
Great Australian Bight
Albany
Adelaide
Darling R.
Murray R.
NEW SOUTH WALES
Newcastle
Sydney
Canberra
Federal Capital Territory
VICTORIA
Ballarat
Melbourne
Bass Strait
TASMANIA
Hobart
Tasman Sea
Coral Sea
GREAT BARRIER REEF
Gulf of Carpentaria
York Peninsula
INDIAN OCEAN
PACIFIC OCEAN
MELANESIA
MICRONESIA
POLYNESIA
Tropic of Cancer
Equator
Tropic of Capricorn
MARIANAS (Jap.)
GUAM I. (To U.S.)
WAKE I. (To U.S.)
MARSHALL ISLANDS (Jap.)
JALUIT
YAP
PELEW IS. (Jap.)
CAROLINE ISLANDS (Japanese)
GILBERT ISLANDS (British)
MIDWAY I.
TERRITORY OF HAWAII (To U.S.)
Honolulu
HAWAII
PALMYRA I. (British)
FANNING I. (British)
CHRISTMAS I. (British)
BAKER I.
HOWLAND I. (To U.S.)
PHŒNIX ISLANDS (British)
ELLICE ISLANDS (British)
UNION ISLANDS (British)
SOLOMON ISLANDS (British)
SANTA CRUZ IS. (British)
NEW HEBRIDES (Jointly by the British and French)
NEW CALEDONIA (French)
LOYALTY ISLANDS (French)
Noumea
Suva
FIJI (British)
SAMOA
SAVAII (To N.Zea.)
UPOLU
Apia
TUTUILA (To U.S.)
TONGA OR FRIENDLY IS. (British)
COOK ISLANDS (British)
SOCIETY ISLANDS
Tahiti (To France)
AUSTRAL ISLANDS (French)
NORFOLK I. (British)
KERMADEC IS. (British)
North Cape
Auckland
NORTH ISLAND
East Cape
NEW ZEALAND
Wellington
Cook Strait
SOUTH ISLAND
Christchurch
Dunedin
CHATHAM IS. (British)
STEWART I.
South Cape
Fig. 565
Political
AUSTRALIA
AND ISLANDS OF THE PACIFIC
Scale of Statute Miles
0 500 1000 1500
885 MILES TO ONE INCH
Capitals: Commonwealth of Australia ◎ Other Capitals ◎
COPYRIGHT, BY AMERICAN BOOK COMPANY
THE MATTHEWS-NORTHRUP WORKS, BUFFALO, N. Y.
70° 80° 90° 100° 110° 120° 130° Longitude 140 East 150° from 160° Greenwich 170° 180° 170° Longitude 160° West 150° from 140° Greenwich

AUSTRALIA AND PACIFIC ISLANDS

	Area, Sq. Mi.	Population	Capital
Australia	2,972,866	5,437,000	Canberra
New Zealand	104,663	1,221,000	Wellington
New Guinea group	311,000	1,000,000	
Other Pacific islands	68,850	1,100,000	

Map Study.—1. Give the latitudes of Melbourne and Cape York. 2. How many degrees of longitude are covered by Australia? 3. What large island is north of it? 4. What is the location of Tasmania? 5. Using the scale of miles, determine the distance from Sydney to Perth; from Sydney to Wellington in New Zealand.

6. Name and bound the five states and one territory of the Australian continent. 7. Name and locate the capital of each state. 8. Describe the courses of the Murray and Darling rivers. 9. Give the name of the chief mountain range of Australia and describe its position (Fig. 566).

10. From the map estimate what share of the surface of Australia lies in the Torrid Zone. 11. Compare the latitude of Auckland, in New Zealand, with that of Buenos Aires. 12. Compare the latitude and longitude of Auckland with those of London.

13. What group of islands in the Pacific Ocean is in longitude 180°? 14. Locate the Samoa group of islands; the New Hebrides; New Caledonia; the Solomon Islands.

558. Physical Geography of Australia.—Australia has sometimes been called an island, but it is so large and so far from other large lands that it may properly be called a continent. It is more than 2000 miles across from east to west, and it averages more than 1000 miles in width from north to south. The area is nearly 3,000,000 square miles, making it three fourths as large as Europe.

Every other inhabited continent is crossed either by the Arctic Circle or by the Equator, but Australia is between 10° and 40° south latitude. It is 4500 miles from Africa, and 7500 miles from South America. It is about 2000 miles by sea from Australia to Asia, though the journey lies among the East Indies. Even New Zealand, which we often name with Australia as being in the same part of the world, is 1000 miles away.

The coast line of Australia is somewhat like that of Africa, for it is but little broken by bays, and hence has but few natural harbors. Much of the interior is so dry that there are few rivers. Along some parts of the shore one might travel for hundreds of miles without crossing a river. Thirty miles or more off the northeast coast, the Great Barrier Reef, a coral formation, extends for about 1000 miles.

In surface, Australia consists of a central plain, bordered by mountains on all sides except on the south. There are, however, no very high mountains on the continent. The largest and highest mountains make up the Great Dividing Range, which follows the east coast, and is not very far from it. The highest parts are toward the south, where the range is sometimes called the Australian Alps, and has peaks more than 7000 feet in altitude. The mountains of the northern and western borders are lower.

The interior plain has many hills or low mountains. Most of the streams dry away or enter lakes which on account of the dry climate have no outlets. The largest rivers, however, the Murray and its tributary the Darling, flow westward from the Great Divide and carry their waters to the sea on the south. On the east, north, and west borders, short rivers flow from the mountains to the ocean.

The southeast trade winds bring ample moisture to the eastern parts of Australia, where they rise in crossing the slopes of the Dividing Range and are chilled as a result of

Fig. 566

Physical and Political

AUSTRALIA AND NEW ZEALAND

the greater elevation. It is in these mountains that the Murray and Darling rivers have their origin. The conditions are the same as in eastern Brazil and southeastern Africa. In the Australian summer, which occurs during our winter, the belt of equatorial calms and heat moves southward over northern Australia, and gives ample rain. In the Australian winter, occurring at the time of our summer, when the equatorial heat belt and the wind belts move northward, southwestern Australia gets some moisture from the prevailing westerlies of the Southern Hemisphere. In the summer, the westerly winds are too far south to touch Australia.

Fig. 567. Kangaroo

Fig. 568. Australian natives, with spears and boomerangs

The interior and the south-central coast of the continent are dry, and much of the land is a desert (Fig. 367). The climate is continental, hot in summer and cold in winter. Much of the interior has as little as five inches of rainfall a year. Parts of the east and north coasts have more than fifty inches.

The animals and plants of Australia are very different from those of other continents. The kangaroo (Fig. 567) is one of the peculiar native animals. Like many of the other Australian animals, it carries its young in a fold of its skin. Its front legs are short, but the hind legs and tail are long and strong. In leaping over the ground the animal stands nearly upright and uses its hind legs and tail. The common domestic animals have been introduced from other countries.

559. People of Australia.—The natives of the continent (Fig. 568) are a very dark-skinned people, who in many ways, however, are unlike the negro. They are thin and muscular, with heavy beards and straight or wavy hair. When the white man first came to Australia, these natives, or aborigines, were rude savages. Some of them are still wild men, but there are not nearly so many as when they had the land to themselves.

Soon after the time of the American Revolution, Great Britain began to settle Australia. Many of the first white inhabitants were convicts, sent out to Australia instead of being shut up in British prisons. Then a better class of people began to go in search of homes and of new chances to make a living. Thus Australia was occupied by several British colonies, including New South Wales, Victoria, Queensland, and others. In 1901 all these colonies, now called states, together with Tasmania, the large island south of the continent, were united to form the Commonwealth of Australia. Like Canada, this part of the British Empire is self-governing, but works in harmony with Great Britain in foreign affairs. Canberra, situated in the Federal Capital Territory in New South Wales, is the capital of the Commonwealth. Australia has made many laws in favor of laborers. The people believe in a "white Australia," and prevent the immigration of the black or yellow races.

The population is less than that of London. About two thirds of the people are in the states

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Fig. 569. Sheep at a watering place, New South Wales, Australia

of New South Wales and Victoria, leaving only a sparse population in the remainder of the continent.

560. Products and Industries of Australia.—Agriculture and grazing are the main occupations in Australia. The same is true of Canada, Argentina, Siberia, and the newer parts of the United States. This is the rule in large countries that are young in development, and have broad plains suited for fields and pastures. The principal grain of Australia is wheat, and some wheat is sent abroad, particularly to Liverpool. Much fruit is raised, especially grapes, and much wine is made. In Queensland, where the climate is moist and hot, sugar cane is the leading product, and tropical fruits flourish.

Australia has over 80,000,000 sheep, and sends to the world's markets more wool than any other country. As merino sheep were taken from Spain to America, so they were carried to South Africa and Australia. The climate, and the grasses and other wild plants of the region, aid in producing wool of excellent quality, and there is room on the ranches for large flocks (Fig. 569). The event of the year is sheep shearing. The wool goes to one of the seaports and is transported to the mills of England and other countries.

Cattle also are raised, and hides, tallow, butter, and frozen beef, as well as frozen mutton, are shipped to Great Britain. Dairy supplies produced in Australia during the southern summer may in a few weeks reach England in the northern winter, when the cattle of Europe are living under cover on dry food.

Gold to the value of many hundred million dollars has been taken from Australian mines, and the country still ranks next after South Africa and the United States among the gold producers of the world. Silver, lead, copper, tin, and coal are found.

Fig. 570. A business street in Melbourne, Victoria

The Australians have most of the necessary raw materials to make a rich and populous country, although manufacturing has not yet been extensively developed.

561. Cities and Routes of Australia.—There are two great cities in the Commonwealth, each with more than 700,000 people.

Fig. 571. Harbor at Sydney, New South Wales

One is Melbourne, the capital of the state of Victoria (Fig. 570). The other is Sydney, the capital of New South Wales (Fig. 571). Adelaide is the capital of South Australia (Fig. 572). Other important cities are Brisbane, the capital of Queensland (Fig. 573), Perth, the capital of Western Australia, and Hobart, the capital of Tasmania. Ballarat and Bendigo are mining towns in Victoria. As the interior is so dry, all the large cities are on the seacoast.

Fig. 572. Street in Adelaide

Most of the railroads are in New South Wales, Victoria, and Queensland. A railroad has been built near the south coast, across Australia from east to west, and another has been proposed which will run through the center of the country across the great desert, from the southern seaports to the northern shore.

A great sea route to Australia from Europe is by way of the Suez Canal and Aden to Adelaide and Melbourne. Another route runs from Colombo in Ceylon to Singapore and Sydney. To Sydney, steamships make regular trips from Vancouver and San Francisco. The route from London to Sydney by way of the Panama Canal is shorter than by way of the Suez Canal. Other sea routes pass around the Cape of Good Hope and Cape Horn, and many steamships ply between Australia and New Zealand. There is cable communication with southern Asia and with Vancouver. Many ships going between Australia, or New Zealand, and the western coast of North America, call at Honolulu in the Hawaiian Islands.

562. New Zealand.—The Dominion of New Zealand is part of the British Empire. There are two principal islands, separated by Cook Strait, and many small islands. The group is 1000 miles long, and contains a little more than 100,000 square miles. It is thus about as large as the state of Colorado. The population is somewhat over 1,000,000, including about 50,000 Maoris. These are the native people of the islands. They are a strong race, and many are now civilized and intelligent citizens of the British Empire.

Fig. 573. Brisbane, Queensland

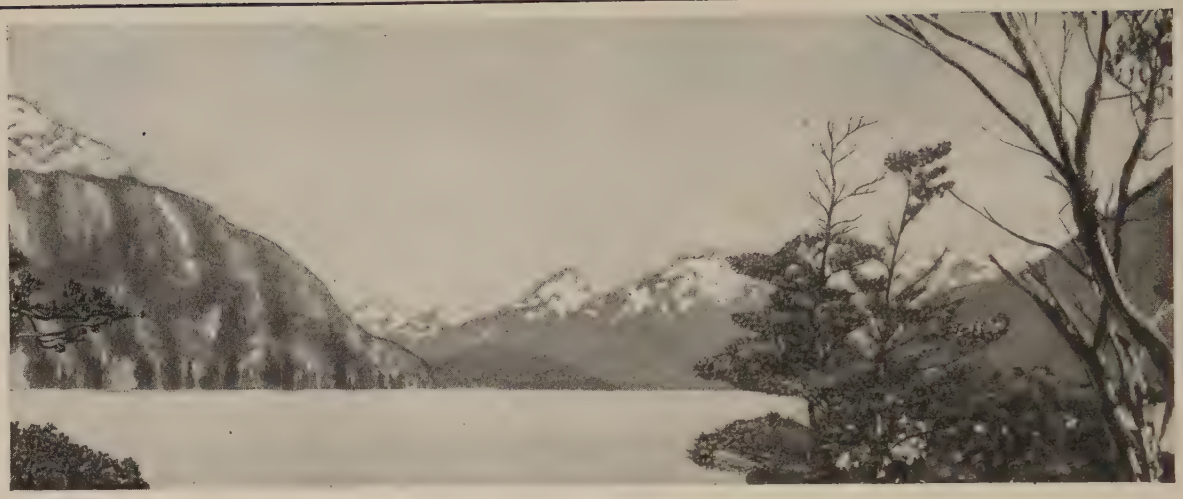

Fig. 574. Lake and mountains in southern New Zealand

Much of the surface is mountainous, and has magnificent scenery (Fig. 574). Deep bays penetrate the shores among lofty peaks. Mountain ranges form the backbone of both the large islands, and there are regions of glaciers and perpetual snow, as well as active volcanoes, geysers, and other hot springs. There are many rivers, but most of them are short mountain torrents. There are also fertile plains. The industries are much like those of Australia. Except in the high mountains, the climate is mild. The rainfall is greatest on the west side, because the islands are in the course of the westerly winds. Wheat and oats are the leading field crops, and wool, frozen meat, butter, and hides and skins are the leading exports. Most of these go to Great Britain. Auckland and Wellington (Fig. 575) are the principal cities.

Fig. 575. Wharves at Wellington, New Zealand

563. Islands of the Pacific Ocean.— Thousands of islands are scattered over the Pacific, but only a few of the larger groups are important. Most of the East Indies are considered as belonging with Asia (Sec. 523). New Guinea, however, is near Australia and is somewhat like it as to its animals and plants. It is a vast island, with an area of more than 300,000 square miles. It has mountains which rise more than 15,000 feet above the sea. Australia and the Netherlands each control parts of the island. Near New Guinea, on the east, are the Bismarck Archipelago and the Solomon Islands.

The New Hebrides, New Caledonia, the Fiji, the Tonga (Fig. 576), and the Samoa islands (Fig. 577), are south of the Equator. New Caledonia is governed by France, and the New Hebrides jointly by France and Great Britain. There are 200 islands of the Fiji group alone, all belonging to Great Britain. The Samoa Islands are divided between the United States and New Zealand.

Fig. 576. Native children, Tonga Islands

Fig. 577. Native hut, Samoa

Some of the Pacific Islands are of volcanic origin, consisting of mountains and hills, and in some, as in Hawaii, active volcanoes are still found. These volcanic islands are sometimes referred to as the "high islands." In contrast are many "low," or flat islands due to coral growth (Fig. 578). The hard or stony parts of the corals are broken and worn by the waves into small bits. These accumulate and the waves push them above the surface of the ocean, forming islands.

The natives of most of the islands were originally savages, often cruel and degraded. By the heroic work of missionaries, and by the aid of foreign governments, most of the people have now come to an orderly and more or less civilized mode of life.

The principal value of the smaller islands to the United States, and to the nations of Europe, is as coaling stations, and as harbors for warships and the ships of commerce.

Review.—1. Describe the surface of Australia. 2. Explain the rainfall of the several parts of Australia. 3. Describe one of the native animals.

4. Describe the native people of Australia. 5. How did the British people first make use of the country? 6. What is meant by a "white Australia"? 7. When was the Commonwealth of Australia formed?

8. What are the chief agricultural products? 9. Give an account of sheep raising.

10. What are the principal seaports? 11. Name the two leading cities of Australia. 12. What railroad is planned? 13. Name the chief sea routes to other countries.

14. How far is New Zealand from Australia? 15. What is the length of the New Zealand group? The area? 16. Name some of the principal physical features. 17. What products are common to New Zealand and Australia?

18. Give an account of New Guinea. 19. What nation controls New Caledonia? The Fiji Islands? 20. Name two classes of islands, according to their surface. 21. What is the main value of the smaller islands to the nations that control them?

Fig. 578. Coral growing on a reef along the coast of Australia

THE EARTH AS A WHOLE

564. Size of the Earth.—The earth is a ball or globe, and its diameter, or the greatest distance through it, is nearly 8000 miles. The circumference is a little more than three times as great, or nearly 25,000 miles. It is not easy to imagine how large the earth is, although it does not seem so large as it did to our forefathers, because we can travel more swiftly than they, and can send messages by telegraph. Even now, a swift passenger ship would take about seven weeks to sail around the earth. If there were lands on which a railroad could be built at the Equator, a train moving forty miles an hour would require twenty-six days to make the journey.

565. Shape of the Earth.—The earth is not a perfect sphere, for it is flattened at each pole so that the polar diameter is about 26 miles shorter than the diameter at the Equator. But if a baseball or a school globe were flattened in this proportion the difference would be so small that we should fail to notice that it was not a perfect sphere.

Long before the time of Christ a few men believed the earth to be round. But most persons did not believe it until about four hundred years ago. They thought the earth was flat, and they had curious ideas as to what held it up.

If the earth were flat, the hull of a ship would be the last part to disappear from sight as the ship leaves a port, for it is the biggest part. But in reality the hull goes out of sight first, then the rigging, then the smoke, showing that the ocean has a curved surface. We know the ocean has a curved surface for the further reason that we can sail around the world and come back to the place we left.

When the earth's shadow falls on the moon, the edge of the shadow is always part of a circle. No object but a sphere will always cast a circular shadow. When we go from the Northern Hemisphere to the Southern, or from the Southern Hemisphere to the Northern, some stars go out of sight and others come into view. If the earth were flat, we should see the same stars wherever we went. In all these ways we know that the earth has a curved surface, and since the amount of curvature has been measured, it has been found that the curved surface is that of a sphere.

In former times men could not easily believe in a round earth, because they thought people would fall off from the other side of it. They thought people on the other side of the world would have their feet up and their heads down. But the only *down* is toward the center of the earth, and the only *up* is away from the center of the earth. Men and all objects are held to the earth by an invisible force called gravitation. For this reason any object thrown into the air falls again toward the earth's center. The attraction is what gives objects weight. It is not the earth's center, however, that exerts the force, but the whole mass of the earth. The gases that make up the atmosphere are bound to the earth in the same way. There is less air at the tops of high mountains than on low plains. We say that the air there is rare, and people have difficulty in breathing. The waters of the earth are gathered into the low parts, but they are spread over nearly three fourths of the earth's surface, because the surface is so nearly round.

566. Surface and Materials of the Earth.—We have already learned that the land surfaces are uneven, but the height of mountains is small compared with the diameter of the earth. The highest mountains rise less than six miles above sea level, while the earth's diameter is nearly 8000 miles.

The earth is everywhere surrounded by the atmosphere, which extends many miles

above the highest mountains. Below the atmosphere, the surface is made up of land and water. The land is nearly everywhere covered with soil, and under the sea almost everywhere are layers of mud. Under the soils of the land and the muds of the sea are the rocks that make up most of the globe. The rocks deep in the interior of the earth are believed to be very hot. One reason for thinking this is that the rocks increase in temperature the deeper we go down a mine shaft. We do not believe that the earth's interior is liquid rock, for it is all under such vast pressure that it would remain solid even if intensely hot.

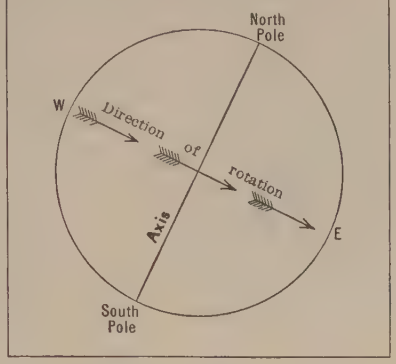

Fig. 579. Axis and poles

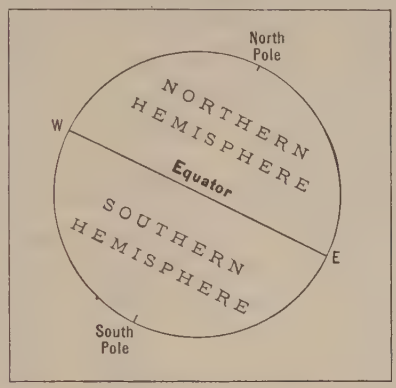

Fig. 580. Equator

567. The Rotation of the Earth.—The earth always turns or spins in the same direction. The line around which it turns we call the earth's *axis* (Fig. 579). One end of this line we call the *North Pole*, and the other end we call the *South Pole* of the earth. The motion is like that of a spinning top. We can think of a line passing through the center of the top, around which it turns. The Pole Star, or North Star, is so called because it is almost in line with the earth's axis. It is always above the North Pole.

We can also think of a line running around the earth, just halfway between the poles. This circle we call the *Equator*, because it divides the earth into two equal parts or hemispheres. North of the Equator is the Northern Hemisphere, and south of the Equator is the Southern Hemisphere (Fig. 580).

The earth makes a complete turn on its axis once in twenty-four hours. This movement is toward the east, where the sun rises, or comes into view in the morning. At the Equator, any person or thing at the surface of the earth travels in one complete rotation about 25,000 miles, or more than 1000 miles an hour. A person is not blown away and does not feel the motion, because the air and everything else around him is moving as fast as he is moving.

568. Directions and the Compass.—Toward the North Pole is north, and toward the South Pole is south. At the North Pole one could not face in any direction but south, and in moving away from the Pole one must go south. At the South Pole the observer faces north, and could not move away from the Pole in any direction but north. The earth turns toward the east and from the west. These four main directions are the *cardinal points*. We also name intermediate directions, such as northeast, southeast, south-southeast.

A compass consists of a magnetic needle mounted on a pivot, so that it will turn freely (Figs. 581, 582). In the mariner's com-

Fig. 581. Engineer's compass

Fig. 582. Mariner's compass

pass the needle carries with it a card showing the directions (Fig. 583). It does not point exactly north except in a few places, but points in general toward a locality in the north of Canada called the North Magnetic Pole. In some parts of the land and sea the needle points west of north, in others east of north. Maps are prepared showing how much the needle varies from true north, and thus the sailor or the explorer can allow for the compass variation.

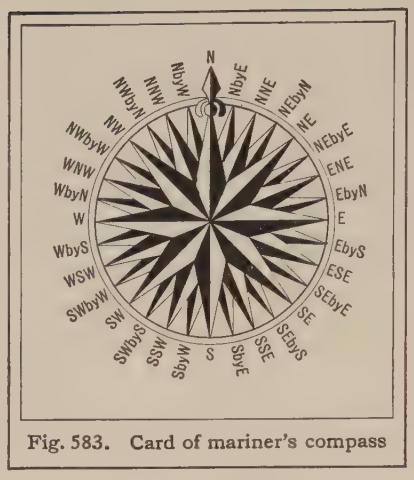

Fig. 583. Card of mariner's compass

569. Latitude.—Every circle is divided into 360 equal parts, and one of these parts is a degree; 360 degrees is written 360°. Each degree is divided into 60 minutes, written 60′, and each minute into 60 seconds, written 60″.

Since a whole circle is 360°, a quarter of a circle is 90°. From pole to pole is 180° on a great circle drawn around the earth through both poles. Angular distance from the Equator to the poles, measured on such a great circle, is called *latitude*,—north latitude, if measured from the Equator north; south latitude, if measured south. One degree of latitude covers about 69 miles of distance. A circle running around the earth parallel to the Equator is a *parallel of latitude* (Fig. 584). All points on such a circle are at equal distances from the Equator. We can draw as many parallels as we like, but it is common to draw them on maps at intervals of 5°, 10°, or 20°. The parallels on a globe are shorter as we go away from the Equator.

If a person were at the North Pole, the Pole Star would be nearly overhead, or in the zenith. If he were at the Equator, it would be on the horizon. If he moved north from the Equator, for every degree he traveled, the North Star would rise one degree above the horizon. Hence the angular distance of the star above the horizon anywhere is nearly the latitude of that place.

Sailors often wish to know the latitude when they cannot see the star. They use an instrument called a sextant, and find out the height of the sun at noon (Fig. 362). Astronomers furnish tables by which the traveler or sea captain can reckon his latitude from the facts learned by using the sextant.

570. Longitude.—Angular distance around the earth from east to west, or west to east, is called *longitude*. If it is noon at any place, it is noon at all places directly north and south on a line running from pole to pole through the place. Such a line is called a *meridian*, or midday line (Fig. 584). We can imagine as many meridians as we like. In giving longitude it is customary to choose one meridian as the starting place from which to measure. This is called the *prime meridian*. The one commonly used is the meridian

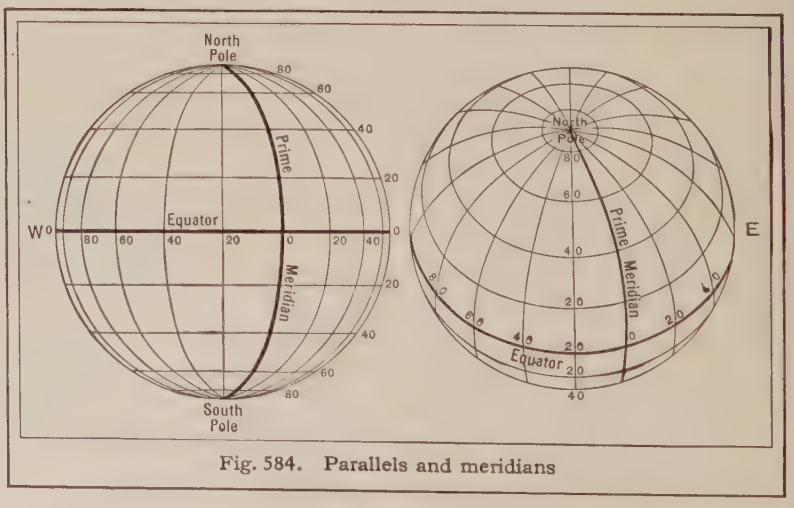

Fig. 584. Parallels and meridians

of the national observatory at Greenwich, in the eastern part of London. From that meridian, most nations speak of all points eastward up to 180°, as in east longitude, and all points westward up to 180°, as in west longitude. A degree of longitude on the Equator measures about 69 miles. North or south of the Equator any two meridians, a degree apart, gradually approach each other until they come together at the poles. Hence the length of a degree of longitude, measured on circles that constantly decrease in size from the Equator toward the poles, diminishes from 69 miles at the Equator to zero at either pole.

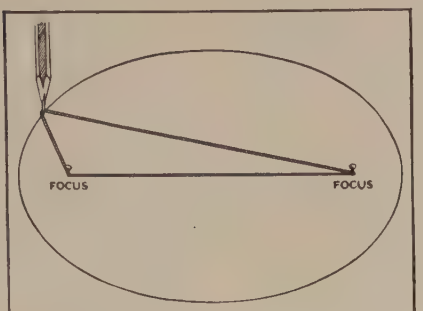

Fig. 585. An ellipse may be drawn by aid of a cord attached to two points called focuses

When a ship captain sails from London to New York, he carries a chronometer, — which is a good watch or clock, — keeping Greenwich time. Every 15° of longitude makes an hour's difference in time (for 15° is one twenty-fourth of 360°). Hence if the chronometer indicates 3 o'clock P.M. Greenwich time, when it is only noon where the ship is, the captain knows he is 45° west of Greenwich, or in west longitude, 45°. On land, people in different places are able to get each other's local or sun time by telegraph, and, by reckoning 15° difference for every hour's difference in time, to find the difference in longitude.

We could not sail the ocean, explore the wilderness, or make accurate and useful maps, if we did not have the system of locating places by their latitude and longitude.

571. The Sun.—Without the sun it would be impossible for animals and plants to live on the earth. Although but a slight part of the sun's heat and light falls on the earth, it makes all the difference between a dead and frozen world, with endless night, and an earth covered with seas and fertile soils, with grasses, flowers, forests, and animals.

When we shrink from the heat of the sun on a summer day, it is hard to believe that the sun is so far away. We can go within a short distance of the hottest bonfire, but we seek a shade tree or a porch to shield ourselves from rays of heat that have traveled 93,000,000 miles, a distance which is too great for us to comprehend.

The sun is more than a million times as large as the earth, and more than 300,000 times as heavy. We cannot understand such size any more than we can realize the sun's distance. The outer parts of the sun are made up of hot gases, and glowing tongues of these gases leap out for thousands of miles.

572. The Revolution of the Earth.—The earth moves around the sun once each year. The curve or track which it follows is called its *orbit*. As the earth is about 93,000,000 miles from the sun, the distance across the orbit is about 186,000,000 miles. This orbit, or track, is not quite a circle, but is drawn out very slightly in the form of an ellipse (Fig. 585). The sun is at one focus of the ellipse. The exact shape of the earth's orbit is shown in Figure 592. For this reason the earth is about 3,000,000 miles nearer the sun at one time in the year than at another.

The earth has kept its place in the orbit, and for ages it has made its journeys around the sun, because of the attraction of gravitation. If there were no attraction of gravitation, the earth would not follow its track but would fly off into space.

We may think of the orbit as in a plane surface like the top of a table. The axis of the earth is not at right angles (90°) with the plane of the orbit, but is inclined $23\frac{1}{2}°$ away from that position (Figs. 579, 589, 592). So the earth goes around the sun once in a year and its axis is all the time inclined in one direction. Hence during part of each year the North Pole is turned a little away from the sun, and the South Pole toward the sun;

and during another part of the year the North Pole is turned a little toward the sun, and the South Pole away from the sun.

573. The Solar System.—The earth is not the only body that revolves around the sun. There are seven other large bodies, and many smaller bodies, of the same kind, and these with the earth are called *planets*. The planets shine because the light of the sun is reflected from them, for they are not, like the sun and stars, balls of hot and glowing substances. Two of the large planets, Mercury and Venus, are nearer the sun than the earth, and hence go around the sun in smaller orbits and in shorter time. They are also smaller than the earth.

The other five large planets are Mars, Jupiter, Saturn, Uranus, and Neptune. They are all farther from the sun than the earth is, and hence move around the sun in larger orbits. All except Mars are much larger than the earth.

All the planets spin, or rotate, on their axes. Some turn in less than one of our days, and others turn so slowly that many days are required to complete a rotation. Some of the planets require a period equaling many years to finish a revolution in their orbits around the sun.

Some of the planets have small bodies that revolve around them. Our earth has one, the moon. Such smaller bodies, revolving around the planets as the planets revolve around the sun, are called *satellites*. The planet Saturn has ten satellites.

All these bodies, the sun, the planets, and the satellites, make up the solar system, that is, the family of spheres or bodies that belong with the sun.

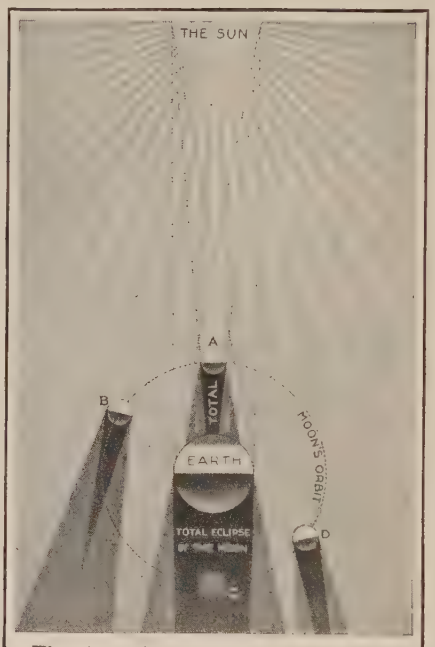

Fig. 586. Eclipses of sun and moon

There are many millions of stars in the heavens and they are much farther from us than any part of the solar system. Some of them are much larger than our sun. Each of the stars is a sun and may have many planets of its own, which are too far away to be seen through a telescope.

574. The Moon.—The moon is the earth's satellite. It revolves around the earth at a distance of about 240,000 miles. The period of revolution is a little less than a month. It also turns once around on its axis in the same period of time. The result is that we have always the same face of the moon toward us.

The moon shines because the sun's light is reflected from it to us. When it is between us and the sun its dark side is toward us. When it passes a little beyond this point, we see it as a narrow curved band of light, and call it the *new moon*. The belt of light increases until the moon is *full*. It then shows an entire half lighted because it is on the opposite side of the earth from the sun.

The moon has a rough and rocky surface, but it has no atmosphere, no soil, and no plants or animals. The attraction which it exerts on the waters of the earth is the main cause of the tides (Sec. 352), and it gives useful light during some of the evenings of each month.

When the moon comes exactly between us and the sun, it shuts off part or all of the sun from view. This is an *eclipse* of the sun, which is either *partial* or *total* (Fig. 586, A). When the earth comes exactly between the sun and the moon, it shuts off the light from the moon, and thus causes an eclipse of the moon (Fig. 586, C).

575. Time.—The rotation of the earth through one full turn takes 24 hours, or a day. This is one unit for measuring time.

One full revolution of the earth about the sun requires a few hours more than 365 days, and affords a natural measure for the period that we call one year. Both the rotation and the revolution of the moon require nearly a month, and furnish another natural division of time.

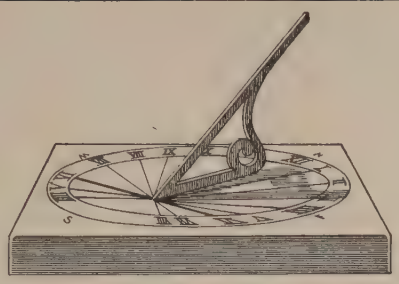

Fig. 587. Sundial

For centuries, many ingenious devices have been made for showing the time by the position of the sun, and the shadow that it casts. Such a device is called a sundial (Fig. 587). In the old days hourglasses were used for measuring time. They were so arranged that a given amount of sand would run from one part of a glass to another through a narrow neck in a given time, usually one hour. Now watches and clocks are commonly used. They are machines that cause one hand, the hour hand, to go around a dial in twelve hours, while the minute hand goes around in one hour. Thousands of regulator clocks are set to true time every day, by a telegraphic signal sent from Washington, D. C., at noon to all parts of the United States.

576. Standard Time.—As it is noon in any place when the sun is highest in the sky, local time is different for all places of different longitude. When it is noon in Greenwich, it is afternoon at all places east of Greenwich, and before noon at all places west of Greenwich. Trains have to be run on schedule time so that they may keep from collision, and so that all may know when they are due to arrive at a given place, or to depart from it. It would be difficult to do this if local, or sun, time were used in every place through which the road runs. Hence it is agreed to use *standard time*. In the United States, for a distance of about $7\frac{1}{2}°$ both east and west of the meridian of 75° west longitude, the people use the local time of that meridian. Similarly, the local time of the meridians of 90°, 105°, and 120° is used. These belts of about $7\frac{1}{2}°$ on each side of a meridian, making about 15° in all, are called *standard time belts*. In going west on a through train, the watch is put back an hour every time we pass from one belt to another. In going east the watch is in like manner put ahead one hour. The time belts in the United States have eastern, central, mountain, and Pacific time.

In practice, the belts are in places less or more than 15° wide, as seen in Figure 588.

577. International Date Line.—If we go around the world by ship, or by ship and train, each day, as marked by the sun, is a little longer or shorter than 24 hours. If we go east, we meet the sun, and it requires less than 24 hours to go from noon of one

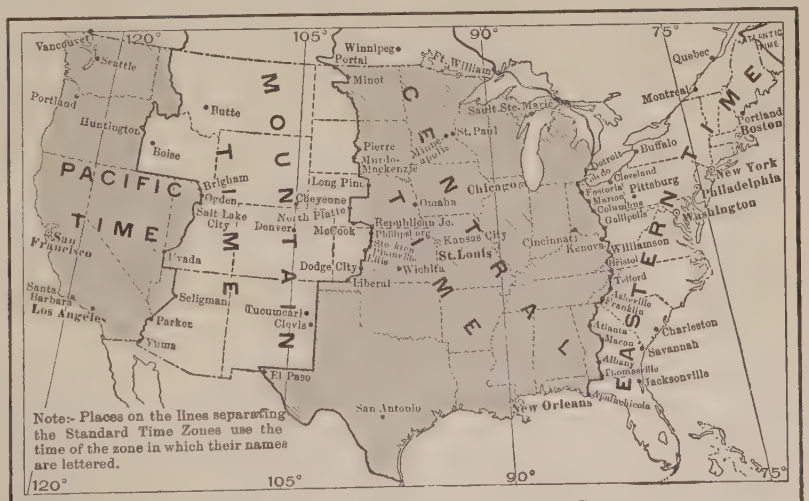

Fig. 588. Standard time belts of the United States

day to noon of the next. In going entirely around the world we should thus reckon one day too many to correspond with the actual days of 24 hours each. If we go around the world to the west, we are going away from the sun, and when it overtakes us at noon, we have gone a little more than 24 hours since the sun marked noon for us the day before. We should thus reckon one day too few in a journey around the world.

Hence the nations have agreed to adopt the meridian of 180° as an *International Date Line*. A ship crossing this line to the east goes back one day in its calendar, while a ship crossing it to the west goes ahead one day. The line is chosen in the Pacific Ocean because the changes in time would be inconvenient if made on land where many people live. (See Fig. 360.)

578. The Zones.—In studying the zones refer constantly to Figure 589, which shows the June position of the earth in relation to the sun in *A*, and the December position in *B*. The two positions of the earth's axis are parallel to each other. For convenience, the sun is represented as small, while in reality it is vastly larger than the earth (Sec. 571). It is also shown as near, though it is really very far away. In *A* the inclination of the earth's axis to the plane of the orbit causes the North Pole, on June 21, to be turned 23½° directly toward the sun. Hence a ray of light from the sun, *a*, shines 23½° beyond the pole. This is the position of the Arctic Circle.

The ray of light *c* falls on the earth vertically at an angle of 90° with the surface, and the latitude at which it falls determines the position of the Tropic of Cancer, which is 23½° from the Equator. The ray *f* reaches a point 23½° from the South Pole. This is the position of the Antarctic Circle.

In *B*, representing the earth December 21, or six months later, the ray of light *g* reaches the Arctic Circle. The ray *j* is vertical 23½° south of the Equator and thus determines the position of the Tropic of Capricorn. The ray *l* shines 23½° past the South Pole, as in *A* ray *a* shines 23½° past the North Pole.

All the surface north of the Arctic Circle we call the Arctic, or North Frigid, Zone. The belt between the Arctic Circle and the Tropic of Cancer is the North Temperate Zone. The belt between the Antarctic Circle and the Tropic of Capricorn is the South Temperate Zone. All the surface south of the Antarctic Circle is the South Frigid Zone. The belt between the two Tropics is the Torrid Zone, divided into halves by the Equator. The sun shines either very obliquely or not at all in the Frigid Zones, and they are very cold. It shines less obliquely on the Temperate Zones, and they have a moderate amount of heat. It is always directly overhead somewhere within the Torrid Zone, and hence this zone is hot.

579. Summer and Winter.—On June 21 the North Pole is turned more toward the sun than at any other time (Fig. 589). The South Pole is turned more from the sun than at any other time. The sun's rays fall everywhere in the North Frigid Zone. In the North Temperate Zone the rays at noon are from 47° to 90° above the horizon. They are vertical at the Tropic of Cancer, and at the Equator they are 66½° above the horizon, or 23½° north of the zenith, the point directly overhead. Hence the whole Northern Hemisphere is then warm, and has its summer. At the same time no sunlight falls in the South Frigid Zone, the sun's rays fall very obliquely on the South Temperate Zone, and the Southern Hemisphere has winter. The summer (Northern Hemisphere) is warmer also because it has long days and short nights, and the winter (Southern Hemisphere) is colder because it has short days (Sec. 580).

On December 21 these conditions are exactly reversed, as shown in *B*. The sun's rays fall obliquely, and the days are short, in the Northern Hemisphere, and hence it has winter. On that date, the sun does not shine anywhere north of the Arctic Circle. At the

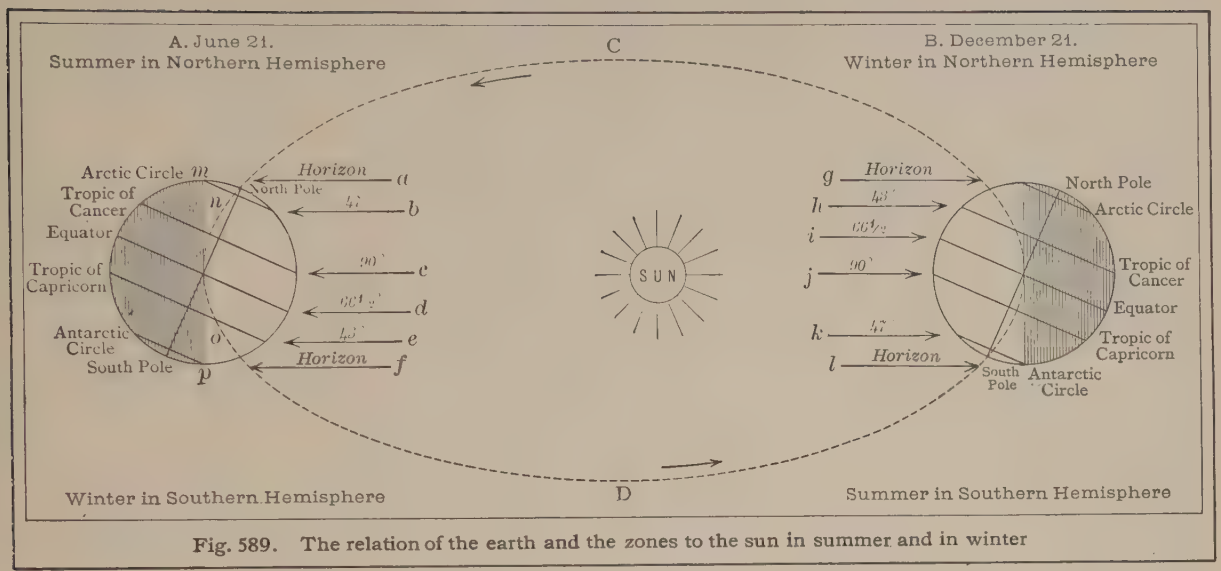

Fig. 589. The relation of the earth and the zones to the sun in summer and in winter

same time, in the Southern Hemisphere the sun rises high in the sky and the days are long. Hence that hemisphere then has its summer. On December 21, the sun shines everywhere south of the Antarctic Circle.

580. Day and Night.—Figure 589 illustrates the different lengths of day and night. A person at the Equator would be in the sunlight during half of one rotation of the earth, and in the shadow during one half a rotation. Hence day and night there would be equal. In the Northern Hemisphere in summer (*A*, Fig. 589) daylight everywhere lasts longer than darkness. A person living at *n*, for example, and going around with the earth as it turns on its axis, is longer in the sunlight than in the shadow. A person at *m*, on the Arctic Circle, would be in daylight for the full period of rotation, or 24 hours, and he would see the sun at midnight, on the horizon in the north. This is the "midnight sun," which many people go to North Cape in Norway to see. Within the Arctic Circle, daylight is everywhere long in summer, and at the North Pole there is daylight for six months, or while the earth is passing from *C* around to *D*; that is, from March 21 to September 22 (Fig. 592).

During this period south of the Equator the night is everywhere longer than the day, for winter there is at the same time as summer in the Northern Hemisphere. A person at *o* (Fig. 589) is longer in the shadow than in the sunlight, as the earth turns. At *p*, on the Antarctic Circle, one would see the sun on the horizon at noon in the north, but it would be night all the rest of the 24 hours. Within the Antarctic Circle night everywhere is long in winter, and at the South Pole it lasts six months.

Near the Arctic Circle the summer is cool and short, because the sun's rays are very oblique, and less heat comes through the atmosphere to the ground. But the days are very long, and the nights short. For this reason vegetables, grasses, and even hardy grains may ripen during the short summer.

Referring now to *B* in Figure 589, we can see that the conditions of day and night are reversed. It is now winter in the Northern Hemisphere, and the days are shorter as we go north, until at the Arctic Circle the sun is seen only at noon, on the southern horizon. The night lengthens as we approach the Pole, where it lasts six months.

The Southern Hemisphere is in its summer and has daylight increasing from a period of twelve hours at the Equator to six months at the South Pole.

Fig. 590

MEAN ANNUAL TEMPERATURE
(By A. Buchan)

Fig. 591

HEAT BELTS
(By A. Supan)

581. Spring and Autumn.—In Figure 592 we imagine that we see the sun and the earth's orbit from such a position that we observe the North Pole, and the earth in its position for each month. The position for June 21 corresponds to *A* in Figure 589, but now we look down on the North Pole, while in *A* we look across it. In like manner, the position for December 21 corresponds with *B* in Figure 589.

Fig. 592. Earth in relation to the sun each month of the year

Look now at the earth as it is related to the sun on March 21. The North Pole is not turned at all toward the sun, and the South Pole is not turned toward it. The sun's rays reach both poles, though we see only one in the diagram. At this time all people on earth, wherever they may be, have day and night of equal length; each is twelve hours long. Hence this date is called the *equinox*, or the time when night equals day. As the season is spring, this is the *spring*, or *vernal*, equinox.

Look now at the diagram for September 22. The conditions are the same as for March 21, and we call the time the *autumnal* equinox.

By looking at other parts of the diagram we can see that the days in the Northern Hemisphere are longer as we are nearer June, and the nights are longer as we are nearer December.

MEAN ANNUAL TEMPERATURE AND HEAT BELTS

582. Mean Annual Temperature.—Among the facts shown by the daily weather maps issued by the Weather Bureau of the national government none are more interesting than the records of temperature and the changes which they show for each place from day to day. On such maps the influence of elevation upon temperature is very clearly shown. In studying the causes which lead to temperature differences on land and sea, as well as for other purposes, it is often desirable to know what the temperature of all places would be if they were at sea level. This is usually found by adding to the temperature as recorded by the thermometer one degree for every three hundred feet of elevation.

It is sometimes desirable also to be able to compare the average temperatures of places for a month or year or for a much longer time.

Figure 590 is a map of the kind described; it shows sea level temperatures, as averaged for a long period of years.

583. Heat Belts.—As we have seen (Sec. 578), the boundaries of the zones are fixed by the way the sun shines at different places and at different times. The zones are really light zones, although named as if they were

heat zones. The distribution of heat, as shown by Figure 590, is affected by winds and other causes besides sunshine.

Figure 591 shows the true heat belts, corresponding in a rough way with the zones. The hot belt is bounded by lines of mean annual temperature; but the temperate belts extend poleward to the line of 50° average temperature for the hottest month.

The hot belt is on both sides of the Equator, but more in the Northern Hemisphere than in the Southern. The north temperate belt is much broader than the south temperate belt and more irregular in outline; it includes nearly half of the land surface of the earth. The temperate belts include some regions of mild temperature and some regions of cold winters and warm summers. In them live the progressive peoples of the world.

We began the studies of this book with the ways of living in the cold north, in the heated tropics, in temperate latitudes, and in desert regions. We have now seen in this chapter that these ways of living depend in great part upon the relations which our earth bears to the sun. The sun makes life on the earth possible and it shapes in many ways the lives of plants, animals, and men.

Review.—1. How large is the earth? 2. How much shorter is the polar diameter than the equatorial? 3. Give reasons for thinking that the earth is nearly a sphere. 4. What is meant by gravitation? What results from it?

5. By what is the earth surrounded? 6. Describe the earth's surface.

7. Define the axis of the earth; the poles. 8. What are the cardinal points? 9. Where is the North Magnetic Pole? 10. What is meant by the variation of the magnetic needle?

11. What is latitude? What is a parallel of latitude? 12. How long is a degree of latitude? 13. What is longitude? What is the prime meridian? 14. How does the length of a degree of longitude vary?

15. Compare the size and weight of the sun with those of the earth. 16. What is the earth's orbit? What is the shape of the orbit? 17. How much is the earth's axis inclined?

18. What is the solar system? 19. What planets are nearer than the earth to the sun? 20. What are satellites?

21. How far is the moon from the earth? 22. How does the moon differ from the earth? 23. How is an eclipse of the moon caused?

24. How do we get the length of our day? 25. What is local time? 26. Define standard time. What names are given to the standard time belts in the United States? 27. What is the International Date Line?

28. What determines the position of the Arctic and Antarctic Circles? Of the Tropic of Cancer? The Tropic of Capricorn? 29. Name the zones.

30. What causes summer in the Northern Hemisphere? 31. What part of the earth has summer about December 21?

32. Why are summer days longer than winter days? 33. What makes it possible to raise some crops in regions far north, where summer is very short? 34. What is the "midnight sun"? 35. What places have day and night six months long?

36. What are the equinoxes? 37. What seasons occur at the time of the equinoxes?

38. Make from memory a sketch map of North America, including the following features: Great Lakes; Mississippi, Colorado, Columbia, Nelson, Mackenzie, and Yukon river systems; Montreal, Vancouver, Seattle, San Francisco, Chicago, New Orleans, New York, Philadelphia, and Washington.

39. Make a sketch map of Europe and include five important rivers, seven national capitals, and the following mountain ranges: Alps, Pyrenees, Apennines, Carpathians. 40. Name the largest island of Europe and the largest island in the temperate latitudes of North America, and compare them as to latitude, area, climate, population, and products.

41. Make a sketch map of your own state, including the capital, the chief cities, your home town, the chief rivers, and leading agricultural and manufactured products. 42. Name the European country whose area is approximately equal to that of your own state. 43. Compare the areas of Massachusetts and Belgium; of Colorado and the British Isles; of Texas and France.

44. Name five important agricultural countries; four important manufacturing countries. 45. What important imports do we receive from South America? What are our leading exports to Europe? 46. Name four important seaports in the United States, two in South America, one in Australia, three in Asia, one in Africa, and seven in Europe.

REVIEW OF IMPORTANT PRODUCTS

WHEAT

(Five-year averages)

World's annual production, 3,265,000,000 bushels.

Leading wheat-growing countries, with percentages of the world crop:

United States	26%
India	10%
Canada	10%
France	8%
Argentina	3%

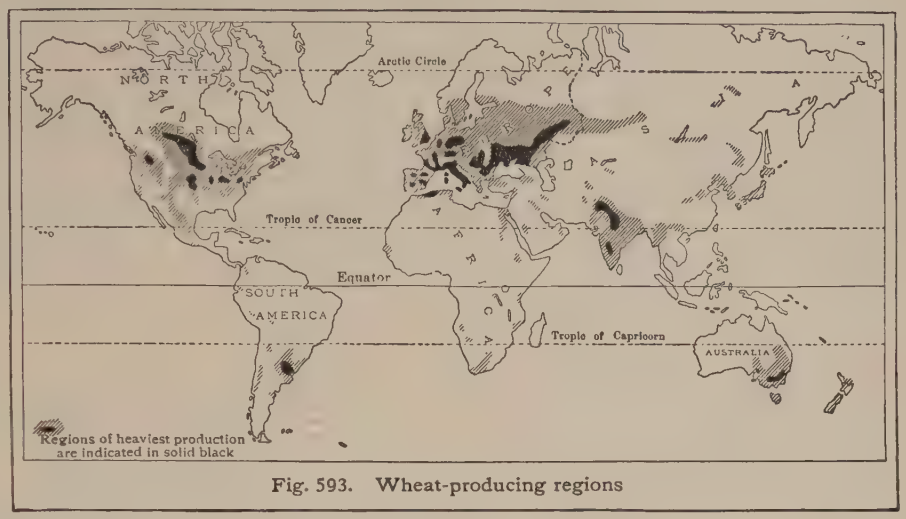

Fig. 593. Wheat-producing regions

Average annual production in the United States, 854,000,000 bushels.

Leading wheat-growing states, with percentages of United States crops:

Kansas	15%	Nebraska	6⅓%
North Dakota	9½%	Washington	5½%
Illinois	6½%	Oklahoma	5½%

Leading wheat-exporting countries: United States, Argentina, Canada.

Reading References.—Sections 182–186, 108, 252, 292, 326, 492 of this book. Carpenter's "How the World is Fed" (American Book Company). Smith's "The World's Food Resources" (Holt). Rutter's "Wheat Growing in Canada, the United States, and the Argentine" (Macmillan Company). Whitbeck's "Industrial Geography" (American Book Company).

CORN

(Five-year averages)

World's annual production, 4,130,000,000 bushels.

Leading corn-growing countries, with percentages of the world crop:

United States	73%
Argentina	5%
Rumania	3½%
Italy	2½%
British Indies	2%
Yugoslavia	2%

Average annual production of corn in the United States, 3,010,000,000 bushels.

Leading corn-growing states, with percentages of United States crop:

Iowa	14⅔%	Indiana	6%
Illinois	10½%	Ohio	5⅓%
Nebraska	7⅓%	Minnesota	4½%
Missouri	6%	Texas	4⅓%

Leading corn-exporting countries: Argentina, United States.

Reading References.—Sections 187, 190, 110, 326. Carpenter's "How the World is Fed," pp. 44–55. Brooks's "The Story of Corn and the Westward Migration" (Rand, McNally & Co.). Myrick's "Book of Corn" (Judd).

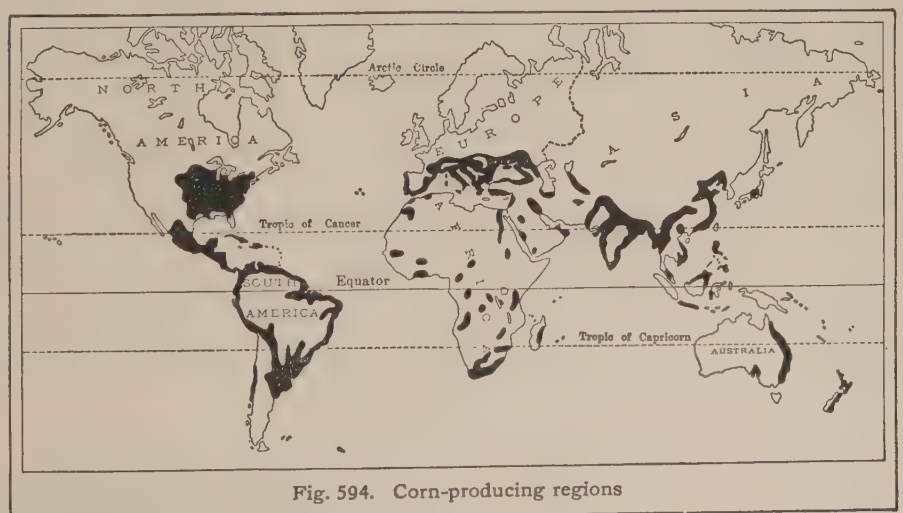

Fig. 594. Corn-producing regions

RICE

(Five-year averages)

World's annual production, 175,000,000,000 pounds.

Leading rice-growing countries, with percentages of world crop:

India	38%
China (estimated)	30%
Japanese Empire	15%

The United States produces less than one per cent of the world total, although the production has considerably increased in recent years.

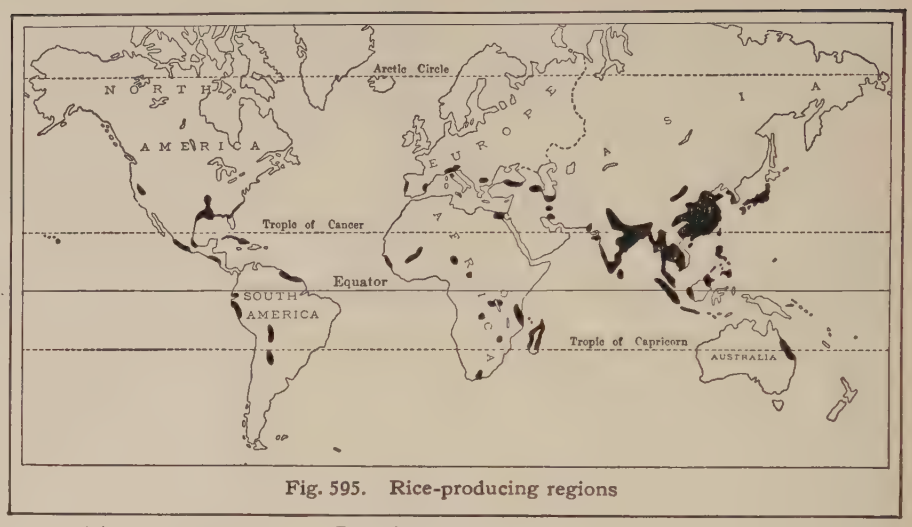

Fig. 595. Rice-producing regions

Leading rice-exporting countries, with percentages of the world's exports of rice:

India	32%
French Indo-China	26%
Siam	17%

Leading rice-growing states in the United States: Louisiana, Texas, Arkansas, California.

Reading References.—Sections 165, 468, 515, 523, 529. Carpenter's "How the World is Fed," pp. 56–66. R. H. Whitbeck's "Industrial Geography"—see index for various countries (American Book Company). Freeman and Chandler's "The World's Commercial Products," pp. 27–49 (Ginn & Co.). King's "Farmers of Forty Centuries" (Mrs. F. H. King, 1540 University Ave., Madison, Wisconsin).

SUGAR

(Five-year averages)

World's annual crop:

Cane	3,700,000 tons
Beet	5,600,000 tons

Leading cane-sugar countries, with percentages of the world's cane-sugar crop:

Cuba	31%
India	23%
U. S. and dependencies	9%
Java	14%

Leading beet-sugar countries are Germany, Czechoslovakia, France, Poland, Italy, Russia, Netherlands, and Belgium. Great Britain imports much beet sugar from the Continent.

The crop of cane sugar in the main body of the United States, of which the state of Louisiana produces the greater part, averages over 200,000 tons a year. This is about $1\frac{2}{3}\%$ of the world's total.

The leading beet-sugar states, with percentages of United States production, are Colorado 27%, California 15%, Utah 15%, Michigan 14%.

Reading References.—Sections 164, 422. Surface's "Story of Sugar" (Appleton). Carpenter's "How the World is Fed," pp. 328–345. Whitbeck's "Industrial Geography." Wiles's "Cuban Cane Sugar" (Bobbs-Merrill Co.). Geerligs's "The World's Cane Sugar Industry" (Van Nostrand Co.).

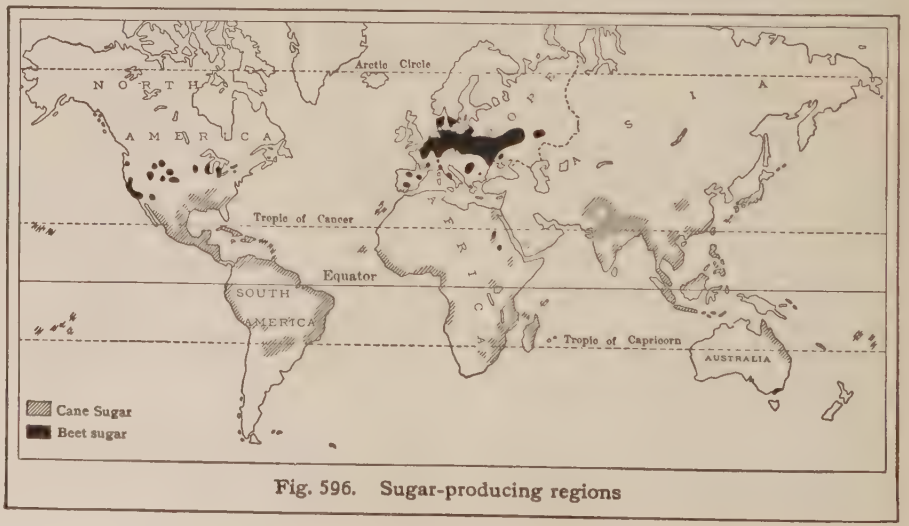

Fig. 596. Sugar-producing regions

TEA

(Five-year averages)

The total production of tea in some countries is not reported. The world's annual *exports* of tea amount to 728,000,000 pounds.

Leading tea-exporting countries, with percentages of the world's exports of tea:

India	46%
Ceylon	25%
Dutch East Indies	12%
China	9%
Japan, etc.	6%

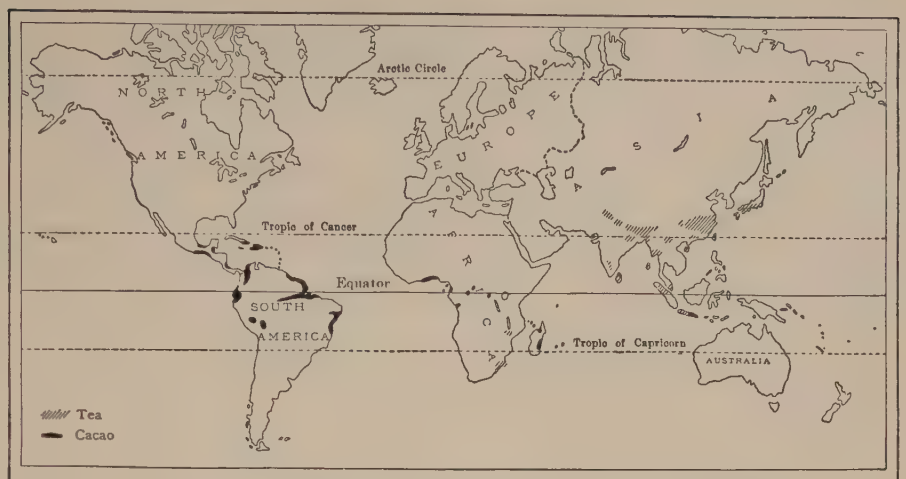

Fig. 597. Tea-producing regions and cacao-producing regions

Among the leading tea-consuming countries Australia uses each year about seven pounds per person, Great Britain six pounds, and Canada four pounds. The United States uses somewhat less than one pound per inhabitant.

Reading References.—Sections 515, 521, 530. Carpenter's "How the World is Fed," pp. 308–316. Whitbeck's "Industrial Geography," consult index. Ibbetson's "Tea from Grower to Consumer" (Sir Isaac Pitman and Sons).

COFFEE (Five-year averages)

World's annual production, about 2,500,000,000 lbs. (Fig. 334); annual exports, 2,300,000,000 lbs.

Leading coffee-exporting countries, with percentages of the world's exports of coffee:

Brazil	67%
Central America	9%
Colombia	5%
Dutch East Indies	4%
Venezuela	2½%

Among coffee-importing countries the United States leads, taking nearly half of the world crop. France is next, taking about one fourth as much as we do. Germany uses much coffee. Belgium and Netherlands are large consumers in proportion to their population.

Reading References.—Section 321. Carpenter's "South America" (American Book Company). Keable's "Coffee from Grower to Consumer" (Sir Isaac Pitman and Sons).

CATTLE

The world's total is about 580,000,000. The leading cattle-raising countries are:

India	25%	Italy	6%
United States	12%	Germany	3%
Argentina	6%	China	3%
Brazil	6%	Russia in Asia	3%
European Russia	5%	France	2%

Reading References.—Sections 192–196, 326. Carpenter's "North America," pp. 252–258 (American Book Company). Brigham's "Commercial Geography," pp. 40–57 (Ginn & Co.).

Fig. 598. Cattle-raising regions

COTTON

(Five-year averages)

World's annual production, 19,000,000 bales of 500 pounds each.

Leading cotton-growing countries, with percentages of world production:

United States	58%
India	20%
China (estimated)	11⅔%
Egypt	5⅔%

World's annual imports, about 11,000,000 bales, of which Great Britain takes about one fourth, Japan about one fifth, and Germany and France about one tenth each. Belgium and Italy also import much cotton.

Average annual cotton production of the United States, 11,000,000 bales.

Leading cotton-producing states, with percentages of United States crop:

Texas	31%	Mississippi	8%
Georgia	9%	Arkansas	8%
South Carolina	9%	Oklahoma	8%
North Carolina	8%	Alabama	6%

Reading References.—Sections 88, 141–143, 163, 412, 550. Carpenter's "How the World is Clothed" (American Book Company). Chamberlain's "How We are Clothed" (Macmillan Co.). Bigwood's "Cotton" (Holt). Scherer's "Cotton as a World Power" (F. A. Stokes Co.).

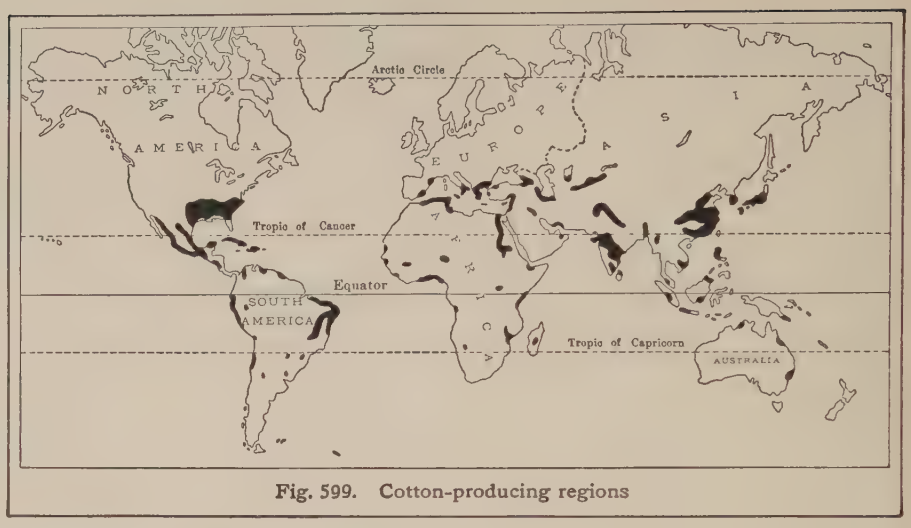

Fig. 599. Cotton-producing regions

WOOL

(Five-year averages)

Annual *exports* of wool reported from all countries, 1,850,000,000 pounds.

Leading wool-exporting countries, with percentages of exports reported for all countries:

Australia	36%
Argentina	17%
New Zealand	11%
British South Africa	11%
Uruguay	5½%

Among the wool-importing countries Great Britain leads, taking about one third, France takes nearly one fourth, the United States about one fifth, and Germany more than one seventh. Belgium is a heavy importer of wool.

These statements are based on abnormal conditions of the wool trade after the World War.

Leading wool-producing states, with percentages of the United States production:

Wyoming	9%	Ohio	6%
Texas	8%	Oregon	6%
Idaho	7½%	Colorado	6%
Montana	7%	New Mexico	5%
Utah	7%		

Reading References.—Sections 226, 89, 413, 560. Carpenter's "How the World is Clothed," pp. 73–90. Ormerod's "Wool" (Holt).

Fig. 600. Wool-producing regions

RAW SILK

(Five-year averages)

It is impossible to obtain accurate figures of the world production of raw silk, as the records of production in the Oriental countries are not complete. In the following table, therefore, the figures for Japan and China are for exports only.

World's annual production approximates 72,000,000 pounds.

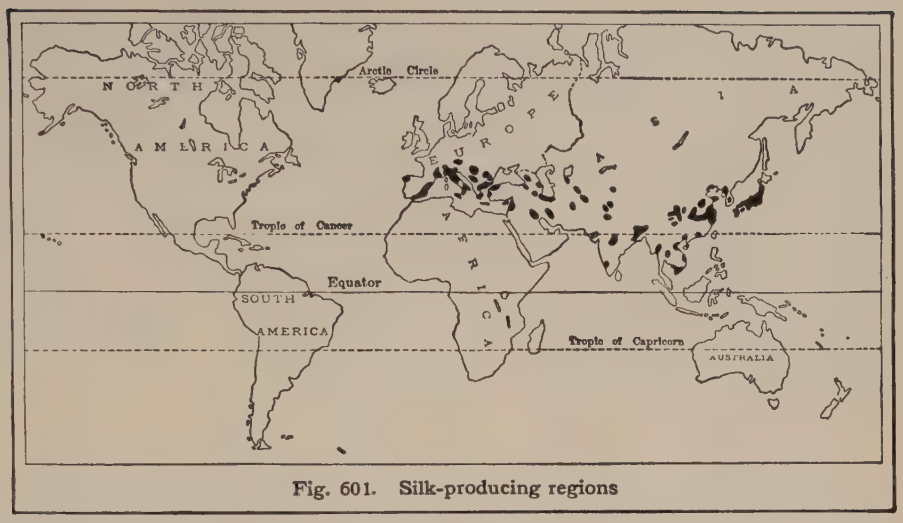

Fig. 601. Silk-producing regions

Leading silk-producing countries, with percentages of the world average given above:

Japan	47%
China	20%
Italy	9%

These three countries lead also in the exportation of raw silk to the United States.

Leading countries exporting manufactured silk to the United States: France, Japan, Switzerland, Great Britain, Italy, and China.

Reading References.—Sections 449–469, 529. Carpenter's "Asia," pp. 50–52 (American Book Company). Carpenter's "How the World is Clothed," pp. 105–127 (American Book Company).

RUBBER (Five-year averages)

World's annual production, 800,000,000 pounds.

Leading sources of rubber, with percentages of world production:

Plantation	88%
Brazil	7½%
Other sources	4½%

Most of the world's rubber is now grown on plantations in the far East. Plantations have been developed in the Federated Malay States, in the Straits Settlements, and in Java, Sumatra, Ceylon, southern India, Borneo, and Dutch and British Guiana. Some rubber is also produced in west and central Africa, Philippine Islands, and Trinidad.

Leading rubber-importing countries (chiefly for home consumption). Three-year averages:

United States	550,000,000 pounds
Great Britain	110,000,000 pounds
France	57,000,000 pounds
Germany	47,000,000 pounds
Japan	34,000,000 pounds
Netherlands	27,000,000 pounds

Reading References.—Section 322. Carpenter's "South America," pp. 312–320. Carpenter's "How the World is Clothed," pp. 240–261. Freeman and Chandler's "The World's Commercial Products," pp. 278–297. Lock's "Rubber and Rubber Planting" (Cambridge University Press).

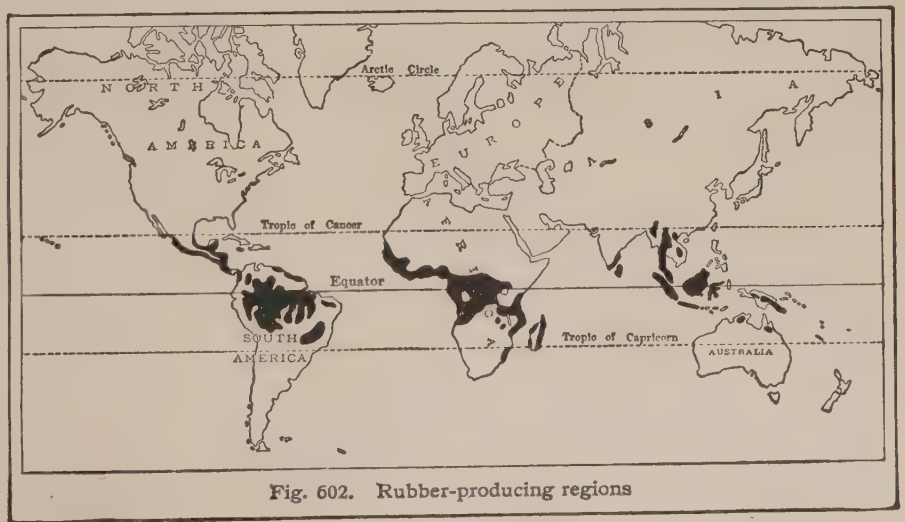

Fig. 602. Rubber-producing regions

FLAX (FIBER)

The greater part of the world's flax fiber is grown in Europe. Before the World War, about 80% of the world's flax fiber was grown in European Russia. Another region of production is in Belgium, Netherlands and northern France. A third center is in the north of Ireland.

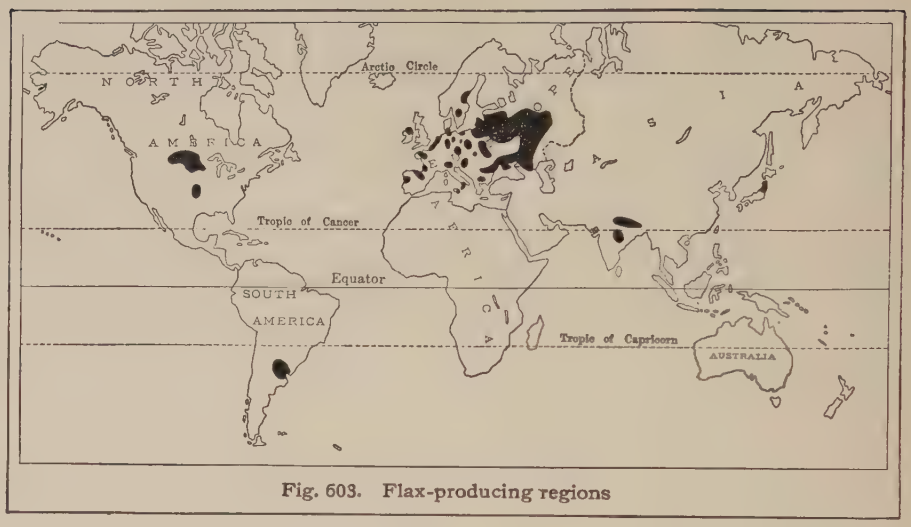

Fig. 603. Flax-producing regions

FLAXSEED

(Five-year averages)

World's annual production, 110,000,000 bushels.

Countries leading in the production of flaxseed, with percentages of world production:

Argentina	22%	United States	18%
India	20%	Canada	12%
Russia	about 20%		

Average annual production of flaxseed in United States, 10,770,000 bushels.

Leading flax-growing states, with percentages of United States production:

North Dakota	46%	South Dakota	17%
Minnesota	33%	Montana	8%

Reading References.—Sections 189, 399, 418, 489, of this book. Carpenter's "How the World is Clothed," pp. 50–59. Freeman and Chandler's "The World's Commercial Products," pp. 313–315.

COAL

World's annual production, 1,350,000,000 short tons.

Leading coal-producing countries, with percentages of world production:

United States	43%
Great Britain	21%
Germany	about 14%
France	about 3%
Poland	$2\frac{2}{3}$%

Of the coal mined in the United States (580,000,000 short tons), only 85,000,000 tons, or less than 15%, is anthracite, and of this amount the state of Pennsylvania produces over 99%.

Leading coal-producing states, with percentages of United States production:

Pennsylvania	40%	Kentucky	6%
West Virginia	$15\frac{2}{3}$%	Indiana	4%
Illinois	13%	Alabama	3%
Ohio	6%		

Reading References.—Sections 111, 112, 169, 411. Martin's "Story of a Piece of Coal" (Appleton). Brigham's "Commercial Geography," pp. 79–91. Carpenter's "North America," pp. 211–218. Whitbeck's "Industrial Geography."

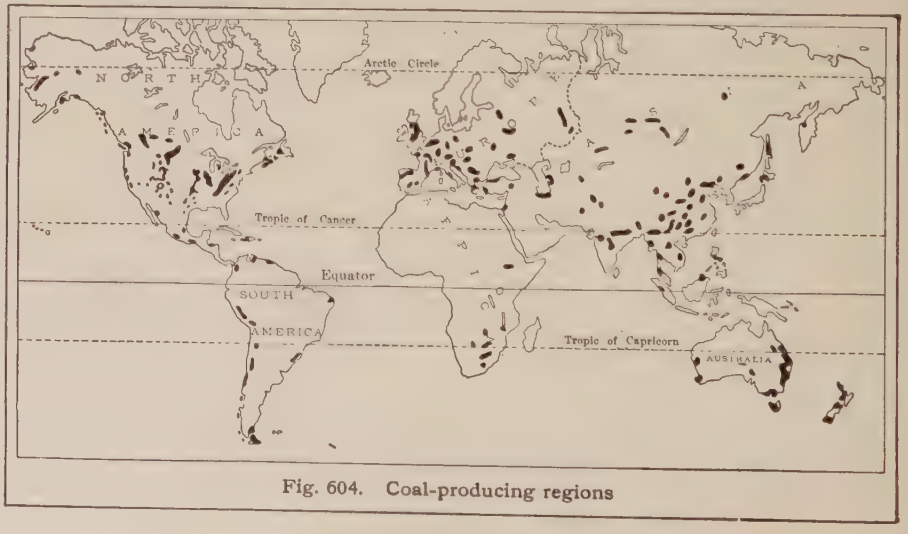

Fig. 604. Coal-producing regions

IRON

World's annual production of pig iron, 51,000,000 long tons.

Countries leading in the production of pig iron, with percentages of world production:

United States	53%
Germany	about 16%
Great Britain	10%
France	10%
Russia	6%
Czechoslovakia	3%
Belgium	3%

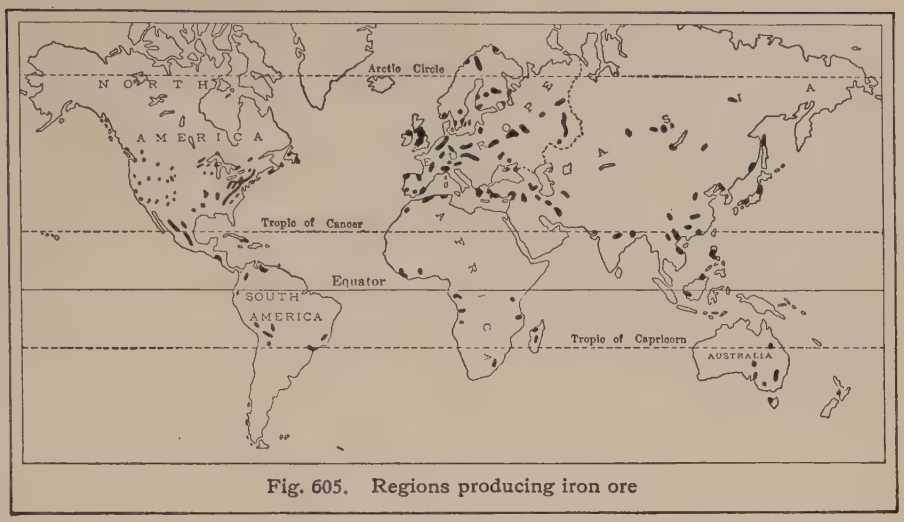

Fig. 605. Regions producing iron ore

Annual production of pig iron in the United States, 40,000,000 tons.

States leading in the production of pig iron, with percentages of United States production:

Pennsylvania	38%
Ohio	23%
Illinois	9½%
Michigan	9½%
New York	7½%
Alabama	7%

Annual production of iron ore in the United States, about 70,000,000 long tons.

States leading in the mining of iron ore:

Minnesota	63%
Michigan	20%
Alabama	10%

Reading References.—Sections 127, 5, 169, 198, 411. Smith's "Story of Iron and Steel" (Appleton). Whitbeck's "Industrial Geography," pp. 177–183. Carpenter's "How the World is Housed," pp. 142–163 (American Book Company).

COPPER

World's annual production, 2,800,000,000 pounds.

Leading copper-producing countries, with percentages of world production:

United States	51%
Chile	16%
Japan	5%
Mexico	4%
Spain—Portugal	4%
Peru	3%
Canada	3%

Annual production of copper in the United States, 1,430,000,000 pounds.

Leading copper-producing states, with percentages of United States production:

Arizona	43%
Montana	16%
Utah	15%
Michigan	10%
Alaska	5%
Nevada	4%
New Mexico	4%

Reading References.—Sections 237, 200. Carpenter's "North America," pp. 182–184. Carpenter's "How the World is Housed," pp. 180–188.

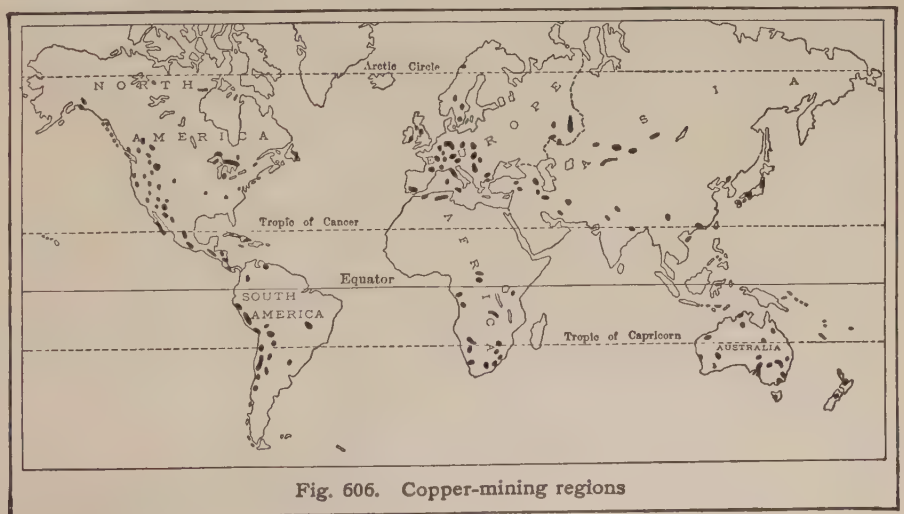

Fig. 606. Copper-mining regions

PETROLEUM

World's annual production, 775,000,000 barrels, each 42 gallons.

Leading petroleum-producing countries, with percentages of world production:

United States	67%
Mexico	20%
Russia	4%
Dutch East Indies	2%
Rumania	1⅔%
India	1%

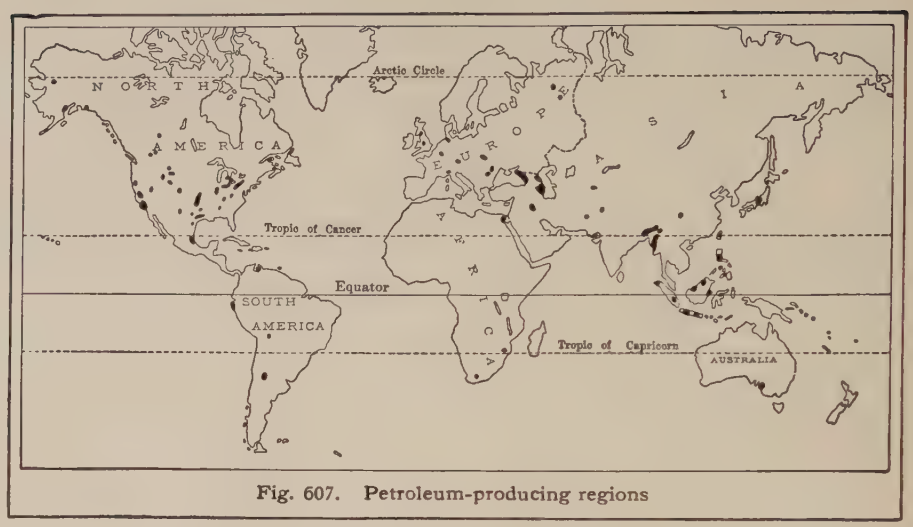

Fig. 607. Petroleum-producing regions

Petroleum production of the United States, 516,000,000 barrels a year.

Leading petroleum-producing states, with percentages of United States production:

California	28%
Oklahoma	24%
Texas	20%
Arkansas	8%
Kansas	7%
Louisiana	5%
Wyoming	5%

Reading References.—Sections 113, 171, 255, 541. Tower's "Story of Oil" (Appleton). Carpenter's "North America," pp. 203–207. Carpenter's "How the World is Housed," pp. 286–290.

GOLD AND SILVER

World's annual production of gold, $343,000,000.

Leading gold-producing regions, with percentages of world production:

Africa	54%
United States	15%
Mexico	7%
Canada	7%
Australia	6%
South America	4%
British India	2%
Japan-Chosen	2%

World's annual production of silver, $146,000,000.

Leading silver-producing regions, with percentages of world production:

Mexico	38%
United States	29%
South America	9%
Canada	8%
Asia	4%
Australasia	4%

Reading References.—Sections 235, 236, 261, 291, 556, 560. Mead's "Story of Gold" (Appleton). Carpenter's "Africa," pp. 303–309; "Australia," pp. 39–44; "North America," pp. 266–273.

General References.—Some mineral industries (notably petroleum) are subject to rapid changes because of the discovery of new fields and the decreased production of old fields, and for other reasons. Consult "Mineral Resources of the United States" (Annual, United States Geological Survey), or Roush's "The Mineral Industry" (annual, McGraw-Hill Book Company).

Fig. 608. Regions producing gold and silver

BOOKS FOR REFERENCE READING

The books in the following list present in greater detail many of the topics and regions treated in this textbook. They are chosen for their excellence; but some care will be necessary in assigning passages for the pupils' reading. Reference should be made to definite pages, and the children should be asked to read independently only such portions of a book as are reasonably simple and clear.

The following abbreviations are used: American Book Company, New York (A. B. C.); D. Appleton and Company, New York (D. Ap.); The Century Company, New York (Cent.); Ginn and Company, Boston (Ginn); Henry Holt and Company, New York (H. H.); Orange Judd Company, New York (Judd); J. B. Lippincott Company, Philadelphia (Lip.); The Macmillan Company, New York (Mac.); G. P. Putnam's Sons, New York (Put.); Charles Scribner's Sons, New York (Scrib.).

General. — Geographical Readers, especially suitable for the pupils' reading: Carpenter's "North America," "South America," "Europe," "Asia," "Africa," "Australia, Our Colonies, and Other Islands of the Sea" (A. B. C.). Chamberlain and Chamberlain's "North America," "South America," "Europe," "Asia," "Africa," "Australia" (Mac.).

Standard Works of Reference.—Any good modern Encyclopedia. Stanford's "Compendium of Geography and Travel," North America 2 v., Central and South America 2 v., Europe 2 v., Asia 2 v., Africa 2 v., Australasia 2 v. (Lip.). "Cyclopedia of Names" (Cent.). "The Statesman's Year-Book," an annual (Mac.). Dryer's "High School Geography" (A. B. C.). Mill's "International Geography" (D. Ap.). McFarlane's "Economic Geography" (Mac.). Smith's "Industrial and Commercial Geography" (H. H.). Talbot's "Railway Conquest of the World" (Lip.). Freeman and Chandler's "The World's Commercial Products" (Ginn). The Century "Atlas" (Cent.). Stieler's "Hand Atlas" (G. E. Stechert & Co., N. Y.). "National Geographic Magazine" (National Geographic Society, Washington, D. C.).

Sections 11–39. North America.[1] — Russell's "North America" (D. Ap.), "Rivers of North America" (Put.), "Lakes of North America" (Ginn), "Glaciers of North America" (Ginn), "Volcanoes of North America" (Mac.). Brigham's "Geographic Influences in American History" (Ginn). Semple's "American History and its Geographic Conditions" (Houghton, Mifflin & Company, Boston). Smith's "North America" (Harcourt, Brace & Co.).

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[1] In addition to those given in the general list above.

TABLES

1. AREA AND POPULATION OF THE WORLD

SUMMARY

Length of earth's axis (miles)	7,900
Length of equator (miles)	24,900
Earth's Surface (sq. mi.)	**196,900,000**
Pacific Ocean (sq. mi.)	71,000,000
Atlantic Ocean (sq. mi.)	34,000,000
Indian Ocean (sq. mi.)	28,000,000
Arctic Ocean (sq. mi.)	4,000,000
Antarctic Ocean (sq. mi.)	2,700,000
The Sea (sq. mi.)	**139,700,000**

	Sq. Miles	Population
North America	9,392,000	146,126,000
South America	6,856,000	63,850,000
Europe	3,794,000	443,972,000
Asia	17,143,000	895,118,000
Africa	11,514,000	136,272,000
Australia, etc.	3,457,000	8,758,000
Antarctic Cont.	5,000,000	.....
The Land	**57,156,000**	**1,694,096,000**

NORTH AMERICA

United States (States in Table No. 6)	3,088,519	105,711,000
Alaska	590,884	55,000
Dom. of Canada	3,759,365	8,788,000
Nova Scotia	21,428	524,000
N. Brunswick	27,985	388,000
Prince Edw. I.	2,184	89,000
Quebec	706,834	2,361,000
Ontario	376,722	2,934,000
Manitoba	251,832	610,000
Saskatchewan	251,700	757,000
Alberta	255,285	588,000
Brit. Columbia	355,855	525,000
Territories	1,479,000	12,000
Part Gt. Lakes	30,540	.....
Newf'dland, etc.	49,680	268,000
Newfoundland	42,730	264,000
Labrador	6,950	4,000
St. Pierre, etc.	93	5,000
Greenland	838,000	14,000
Mexico	767,300	15,503,000
Central America	206,753	5,813,000
Guatemala	43,640	2,100,000
Brit. Honduras	8,600	45,000
Honduras	44,276	637,000
Salvador	8,170	1,501,000
Nicaragua	49,550	638,000
Costa Rica	18,690	468,000
Panama	33,300	401,000
Canal Zone	527	23,000
West Indies	91,400	9,947,000
Cuba	44,000	2,889,000
Haiti, Rep. of	11,070	2,500,000
Dominican Rep.	18,750	897,000
Jamaica	4,840	858,000
Porto Rico	3,435	1,300,000
Bahama Is.	4,400	53,000
Lesser Antilles	4,905	1,450,000
Bermuda Is.	19	22,000

SOUTH AMERICA

Brazil	3,300,000	30,645,000
Argentina	1,084,000	8,699,000
Paraguay	100,000	1,050,000
Uruguay	69,000	1,495,000
Chile	293,000	3,755,000
Bolivia	440,000	2,890,000
Peru	440,000	4,586,000
Ecuador	118,000	2,000,000
Colombia	466,000	5,855,000
Venezuela	364,000	2,412,000
Guiana, British	95,000	298,000
Guiana, Dutch	50,000	113,000
Guiana, French	30,500	49,000
Falkland Is., etc.	6,570	3,000

EUROPE

United Kingdom	94,350	44,168,000
England	50,850	35,679,000
Wales	7,473	2,207,000
Scotland	30,405	4,882,000
N. Ireland	5,320	1,250,000
Small islands	302	150,000
Irish Free St.	27,040	3,140,000
Germany	179,500	59,857,000
Prussia	109,600	37,075,000
Bavaria	29,180	7,140,000
Saxony	5,789	4,670,000
Other states	34,931	10,972,000
Belgium	11,760	7,684,000
Netherlands	12,772	6,841,000
Denmark	16,585	3,289,000
Iceland	39,770	95,000
Faroe Islands	540	21,000
Norway	124,710	2,646,000
Sweden	172,928	5,904,000
Poland	149,000	27,442,000
Danzig	600	365,000
Lithuania	25,000	2,300,000
Latvia	24,000	1,503,000
Esthonia	18,500	1,110,000
Monaco	8	23,000
Luxemburg	999	264,000
Sarre Basin	750	658,000
Andorra	175	5,000
France	212,822	39,210,000
Spain	192,000	20,784,000
Gibraltar	2	25,000
Portugal	34,264	5,546,000
Azores	922	243,000
Switzerland	15,956	3,880,000
Italy	123,000	40,120,000
San Marino	24	12,000
Malta	124	225,000
Liechtenstein	61	11,000
Austria	30,700	6,131,000
Hungary	36,000	7,841,000
Czechoslovakia	54,700	13,596,000
Yugoslavia	95,000	12,017,000
Rumania	116,000	17,393,000
Bulgaria	40,000	4,910,000
Albania	11,000	832,000
Greece	42,000	4,932,000
Turkey in Eur.	10,000	1,800,000
Russia in Eur.	1,716,500	93,782,000
Russia proper	1,125,000	58,924,000
Ukraine	173,000	25,605,000
Other areas	418,500	9,253,000
Finland	130,000	3,367,000
Arctic islands	33,500	.....

ASIA

Turkey in Asia	295,000	10,000,000
Syria	80,000	3,000,000
Iraq	140,000	2,850,000
Palestine	9,000	757,000
Cyprus	3,580	311,000
Sinai (Egypt)	22,800	26,000
Hedjaz	140,000	600,000
Aden, etc.	15,870	177,000
Oman	75,000	500,000
Other Arabia	906,500	2,000,000
Persia	635,000	9,500,000
Afghanistan	240,900	6,380,000
Portug. India	1,400	548,000
Indian Empire	1,856,500	319,075,000
India proper	1,446,200	305,069,000
Burma	268,700	13,206,000
Baluchistan	141,600	800,000
Nepal	54,000	5,600,000
Bhutan	18,600	250,000
Ceylon, etc.	25,500	4,568,000
Straits Sttl's, etc.	35,600	2,377,000
Siam	245,000	8,266,000
French Indo-China, etc.	256,500	17,269,000
East Indies	788,000	60,694,000
Philippine Is.	115,000	10,351,000
Java	51,000	35,017,000
Sumatra, etc.	185,000	6,295,000
Borneo	290,000	2,459,000
Other islands	147,000	6,572,000
China, etc.	4,300,000	320,880,000
China proper	1,497,000	302,340,000
Tibet	814,000	2,000,000
Sinkiang	550,000	2,000,000
Mongolia	1,076,000	1,800,000
Manchuria	363,000	12,740,000
Hongkong	400	625,000
Weihaiwei	280	147,000
Macao	4	75,000
Japanese Empire	261,300	77,606,000
Japan	147,750	55,961,000
S. Sakhalin	14,700	106,000
Taiwan, etc.	13,400	3,654,000
Chosen	84,250	17,284,000
Dairen, etc.	1,200	601,000
Russia in Asia	6,721,500	41,037,000
Siberia	4,807,000	11,161,000
Kirghiz in Asia	780,000	4,546,000
Turkestan	570,000	7,202,000
Khiva	23,200	519,000
Bokhara	79,200	3,000,000
Azerbaijan	34,000	2,097,000
Georgia	26,000	2,372,000
Armenia	15,000	1,214,000
Russia proper, etc.	191,500	8,926,000
Lake Aral and Caspian Sea	195,600	.....
Arctic islands	14,900	.....

AFRICA

Egypt	Including parts of the Sahara	400,000	13,387,000
Libia		542,000	525,000
Tunis		64,600	2,094,000
Algeria		343,600	5,801,000
Morocco		176,000	5,000,000
Fr. Morocco		154,570	4,340,000
Sp. Morocco		21,200	600,000
Tangier (Int.)		230	60,000
Sahara, remaining part		1,944,000	695,000
Rio de Oro, etc.		82,100	224,000
Fr. West Africa		704,000	12,284,000
Gambia		3,700	248,000
Port. Guinea		13,100	289,000
Sierra Leone		26,900	1,403,000
Liberia		36,800	1,500,000

AFRICA (*continued*)

	Sq. Miles	Population
Gold Coast, etc..	88,800	2,430,000
Nigeria, etc.....	394,000	17,300,000
Anglo-Eg. Sudan	1,014,400	3,400,000
Abyssinia.....	312,000	8,000,000
Eritrea.....	42,500	450,000
French Somali..	6,000	208,000
British Somali..	59,800	300,000
Italian Somali...	190,000	700,000
Uganda.....	111,000	3,072,000
Kenya.....	247,000	2,630,000
Zanzibar.....	1,000	197,000
Tanganyika Ter.	384,200	4,000,000
Belgian Congo, etc.	947,200	15,400,000
Fr. Equatorial Af.	680,600	10,000,000
Fr. Cameroon...	160,000	1,500,000
Angola, etc.....	490,800	4,120,000
Mozambique....	295,800	3,120,000
Union of S. Af...	792,340	6,926,000
C. of Gd. Hope.	277,000	2,781,000
Natal.....	34,710	1,194,000
Or. Free State..	48,340	628,000
Transvaal.....	114,290	2,086,000
S. W. Africa...	318,000	237,000
Rhodesia.....	408,500	1,735,000
Other Brit. S. Af.	313,900	1,989,000
Madagascar.....	228,600	3,545,000
Other islands....	8,730	1,800,000

AUSTRALIA, ETC.

Com. of Australia	2,972,866	5,437,000
Victoria.....	87,884	1,532,000
New S. Wales..	310,660	2,100,000
Queensland....	668,497	758,000
South Australia	380,070	495,000
Western Austr..	975,920	332,000
Tasmania.....	26,215	214,000
Northern Ter...	523,620	4,000
New Zealand....	104,663	1,221,000
New Guinea Gr.	311,000	1,000,000
Bismarck Arch...	18,190	188,000
Solomon Islands	16,950	200,000
New Caledonia..	7,650	51,000
New Hebrides...	5,100	60,000
Fiji Islands.....	8,050	140,000
Samoa Islands..	1,076	45,000
Hawaiian Is.....	6,449	256,000
Other Pacific Is..	5,385	160,000

2. LAKES

	Area, Sq. Miles	Altitude, Feet	Depth, Feet
Caspian.....	169,400±	−85±	3,600±
Superior....	31,200	603	1,008
Victoria.....	27,000±	3,720	270
Aral.....	26,200±	155±	220±
Huron.....	23,200	580	800
Michigan....	22,400	581	870
Baikal.....	13,200	1,680	4,900
Tanganyika.	12,700	2,600	2,000
Great Bear L.	11,200	200	270
Nyasa.....	11,000	1,650	2,316
Chad.....	10,000+	850±	24±
Erie.....	10,000	573	200
Winnipeg...	8,550	710	70
Balkash.....	8,400	780±	135±
Ontario.....	7,260	247	738
Ladoga.....	7,000	55	730
Titicaca.....	4,000	13,860	984
Nicaragua...	2,970	135	260
Great Salt L.	1,750±	4,218±	40±
Dead Sea...	350±	−1,292±	1,280±

3. RACES OF MANKIND

Caucasian, or white.....	860,000,000
Mongolian, or yellow.....	650,000,000
Negro, or black.....	155,000,000
Indian, or red.....	30,000,000

4. RIVERS AND RIVER BASINS

River	Area of Basin, Sq. Miles	Longest Stream, Miles	Navigable, Miles
Amazon.....	2,320,000	3,500	2,686
Amur.....	780,000	2,700	2,400
Colorado.....	230,000	1,000	500
Columbia.....	290,000	1,400	200
Congo.....	1,500,000	2,800	1,100
Danube.....	320,000	1,800	1,700
Dnieper.....	197,000	1,300	1,200
Elbe.....	55,340	612	525
Euphrates.....	490,000	2,000	550
Ganges-Brahmaputra	600,000	1,800	1,300 800
Hwang.....	390,000	2,800	Little
Indus.....	360,000	1,900	400
Irrawaddy....	180,000	1,200	900
Lena.....	900,000	2,800	2,500
Loire.....	46,755	543	Little
Mackenzie.....	680,000	2,100	1,800
Magdalena.....	90,000	1,100	600
Mekong.....	280,000	2,600	1,200
Mississippi-Missouri.....	1,250,000	4,200	2,000 2,400
Murray.....	350,000	1,100	550
Nelson-Saskatchewan...	470,000	1,900	230 600
Niger.....	1,000,000	2,600	2,250
Nile.....	1,300,000	3,700	2,900
Ob.....	1,100,000	3,000	2,000
Orange.....	270,000	1,200	40
Orinoco.....	425,000	1,500	870
Plata.....	1,150,000	2,500	1,600
Po.....	27,000	460	337
Rhine.....	63,265	709	550
Rhone.....	38,180	447	200
Rio Grande....	230,000	1,800	460
St. Lawrence...	565,000	2,100	2,000
São Francisco..	210,000	1,800	1,100
Volga.....	590,000	2,300	2,100
Yangtze.....	690,000	3,100	1,050
Yenisei.....	1,500,000	3,000	1,840
Yukon.....	380,000	1,865	1,600
Zambezi.....	580,000	2,200	1,620

5. GREAT SHIP CANALS

Canal, and Year when Opened	Connections	Length, Miles	Depth, Feet
Welland, 1833	Lake Erie Lake Ontario	26¾	14
Soo (U. S.), 1855	Lake Superior Lake Huron	1⅓	25
Suez, 1869	Mediterranean Sea, Red Sea	103	35
Corinth, 1893	G. of Corinth Aegean Sea	4	26
Manchester, 1894	Liverpool Manchester	35½	28
Kiel, 1895	North Sea Baltic Sea	61	36
Soo (Canadian), 1895	Lake Superior Lake Huron	1⅓	22
Cape Cod, 1914	Cape Cod Bay Buzzards Bay	8	25
Panama, 1915	Caribbean Sea Pacific Ocean	50	41

6. THE UNITED STATES

	Sq. Miles	Population, 1920
Alabama.....	51,998	2,348,174
Arizona.....	113,956	334,162
Arkansas.....	53,335	1,752,204
California.....	158,297	3,426,861
Colorado.....	103,948	939,629
Connecticut.....	4,965	1,380,631
Delaware.....	2,370	223,003
Dist. of Columbia	70	437,571
Florida.....	58,666	968,470
Georgia.....	59,265	2,895,832
Idaho.....	83,888	431,866
Illinois.....	56,665	6,485,280
Indiana.....	36,354	2,930,390
Iowa.....	56,147	2,404,021
Kansas.....	82,158	1,769,257
Kentucky.....	40,598	2,416,630
Louisiana.....	48,506	1,798,509
Maine.....	33,040	768,014
Maryland.....	12,327	1,449,661
Massachusetts.....	8,266	3,852,356
Michigan.....	57,980	3,668,412
Minnesota.....	84,682	2,387,125
Mississippi.....	46,865	1,790,618
Missouri.....	69,420	3,404,055
Montana.....	146,997	548,889
Nebraska.....	77,520	1,296,372
Nevada.....	110,690	77,407
New Hampshire...	9,341	443,083
New Jersey.....	8,224	3,155,900
New Mexico.....	122,634	360,350
New York.....	49,204	10,385,227
North Carolina....	54,426	2,559,123
North Dakota.....	70,837	646,872
Ohio.....	41,040	5,759,394
Oklahoma.....	70,057	2,028,283
Oregon.....	96,699	783,389
Pennsylvania.....	45,126	8,720,017
Rhode Island.....	1,248	604,397
South Carolina.....	30,989	1,683,724
South Dakota.....	77,615	636,547
Tennessee.....	42,022	2,337,885
Texas.....	265,896	4,663,228
Utah.....	84,990	449,396
Vermont.....	9,564	352,428
Virginia.....	42,627	2,309,187
Washington.....	69,127	1,356,621
West Virginia.....	24,170	1,463,701
Wisconsin.....	56,066	2,632,067
Wyoming.....	97,914	194,402
Part of the Great Lakes.....	61,730	
**Main Body.....	**3,088,519**	**105,710,620**

Outlying Territory, etc.

Alaska Territory..	590,884	55,036
Hawaii Territory..	6,449	255,912
Porto Rico.....	3,435	1,299,809
Virgin Islands of the United States ('17).....	132	26,051
Philippine Is. ('18)	115,026	10,350,640
Tutuila, etc.....	77	8,056
Guam.....	210	13,275
Panama Canal Zone.....	527	22,858
Soldiers and sailors stationed abroad		117,238
**Total Outlying....	**716,740**	**12,148,875**
**Grand Total.....	**3,805,259**	**117,859,495**

7. COMMERCIAL STATISTICS OF THE

Countries	Chief Products	Chief Exports	Total Value of Exports
Alaska			$55,087,000
Algeria	Wine, cereals, animals, fruits, tobacco, cork	Wines, wheat, sheep, tobacco, cigarettes	111,747,000
Argentina	Wheat, corn, livestock, wine, flax	Wheat, corn, meat, flaxseed	555,087,000
Australia	Wool, cereals, animal products, minerals	Wool, wheat, meat, hides, skins, butter	489,138,000
Austria	Cereals, potatoes, timber, minerals	Chemicals, ores, furniture, timber, fruits	208,790,000
Belgium	Manufactures wool, cotton, iron, steel	Coal, wool and cotton yarn, textiles, iron	462,220,000
Bolivia	Silver, tin, copper, rubber, cacao, coffee	Silver, tin, rubber [and steel goods	24,587,000
Brazil	Coffee, sugar, cotton, rubber, cacao, cattle	Coffee, sugar, cotton, leather, cacao	301,972,000
Bulgaria	Cereals, fruits, wine, tobacco	Cereals, tobacco, hides, attar of roses	29,801,000
Canada	Agricultural prod'ts, textiles, wood, minerals	Wheat and flour, wood, pulp, paper	994,797,000
Ceylon	Rice, tea, coconuts, rubber	Rubber, tea, coconuts, oil, graphite	86,481,000
Chile	Nitrate, copper, silver, cereals, wines	Nitrates, copper, meat, iodine	110,157,000
China	Cereals, vegetables, silk, cotton, coal, iron,	Silk, beans, bean cake oils, cotton	536,815,000
Colombia	Coffee, bananas, minerals, cattle [textiles	Coffee, platinum, bananas, hides	63,512,000
Costa Rica	Coffee, bananas, gold, silver	Coffee, bananas, cacao, gold, silver	14,224,000
Cuba	Sugar, tobacco, fruits [iron	Sugar, tobacco	325,478,000
Czechoslovakia	Sugar beets, potatoes, cereals, timber, coal,	Textiles, glass, coal, timber, sugar, iron	369,925,000
Denmark	Dairy products, cereals, potatoes, fish	Dairy products, animals, metal goods,	246,329,000
Dominican Rep.	Sugar, cacao, tobacco, coffee	Sugar, cacao, coffee, tobacco [textiles	15,231,000
Dutch E. Indies	Sugar, rubber, cinchona, tea, tobacco, tin	Sugar, coffee, tea, cinchona, rubber, tin	437,408,000
Ecuador	Cacao, coffee, ivory, nuts, rubber	Cacao, ivory, nuts, Panama hats, coffee	12,807,000
Esthonia	Cereals, potatoes, flax, timber, animals	Flax, timber, cellulose, meat	16,556,000
Egypt	Cotton, cereals, vegetables, sugar	Cotton, textiles, cereals	273,961,000
Finland	Timber, cereals, animals	Timber, pulp and paper, meats	117,648,000
France	Cereals, textiles, wine, iron, coal, potash	Textiles, clothing, chemicals, automobiles, wine	1,850,571,000
Germany	Cereals, potatoes, sug. beets, coal, iron, text'l's	Textiles, metal work, chemicals, coal	1,448,054,000
Great Britain	Textiles, coal, iron and steel goods	Textiles, coal, iron and steel	3,510,394,000
Greece	Currants, wine, cereals, tobacco, olives, nuts	Currants, olives, tobacco	82,154,000
Guatemala	Coffee, sugar, bananas, animals, dye woods	Coffee, bananas, sugar, timber, hides	14,726,000
Haiti	Coffee, cotton, cacao, sugar, logwood	Coffee, cotton, cacao	14,591,000
Hawaii	Sugar, pineapples, coffee, honey, hides	Sugar, fruits, coffee, rice	102,667,000
Honduras	Bananas, coconuts, coffee, rubber, tobacco	Bananas, coconuts	10,016,000
Hungary	Cereals, animals, wood, coal, grapes, sug. beets	Flour, animal products	100,627,000
India	Rice, tea, wheat, cotton, jute, cattle	Tea, jute, oil seeds, cotton, rice, gums	1,018,786,000
Irish Free State	Vegetables, animals, flax, hay, fish	Animals, meats, dairy products	*
Italy	Cereals, fruits, wine, raw silk	Raw silk, textiles, wines, fruits	508,913,000
Japan	Rice, raw silk, tea, coffee, coal	Silk, cotton and silk goods, tea, matches	884,162,000
Latvia	Cereals, flax, timber, potatoes	Flax, timber	31,252,000
Lithuania	Cereals, potatoes, flax seed, timber	Animal prod'ts, timber, flax, hides, wool	14,680,000
Mexico	Silver, gold, copper, lead, petroleum, sugar,	Metals, petroleum, heniquen	202,664,000
Morocco	Cereals, animals, fruits, nuts [henequen	Cereals, eggs, almonds, flaxseed, beans	23,542,000
Netherlands	Cereals, potatoes, sugar beets, animals	Dairy products, textiles, sugar, bulbs	509,566,000
Newfoundland	Fish, iron, and copper, wood pulp, paper	Codfish, pulp and paper, iron ore, etc.	20,937,000
New Zealand	Wool, meat, dairy products, metals	Wool, meat, dairy products, hides, skins	210,292,000
Nicaragua	Coffee, sugar, fruit, timber	Coffee, sugar, timber, bananas	7,903,000
Norway	Fish, timber, wood pulp, animal products	Animal products, fish, timber, paper	133,969,000
Panama	Fruits, cacao, coffee, rubber, wood, coconuts	Bananas, cacao, coconuts, gum	2,394,000
Paraguay	Cattle, maté, quebracho, tobacco, sugar	Hides, oranges, tobacco, timber, meat,	5,752,000
Persia	Cereals, fruits, gums, wool, cotton, petroleum	Petroleum, rugs, fruits, opium [quebracho	66,627,000
Peru	Sugar, cotton, coffee, cacao, copper, petrol'm	Sugar, cotton, copper, petroleum	99,673,000
Philippines	Rice, hemp, coconuts, sugar, tobacco, fruit	Hemp, sugar, copra, cigars	120,753,000
Poland	Cereals, sug. beets, potatoes, coal, salt, petr'l'm	Cereals, sugar, textiles, salt	230,748,000
Porto Rico	Sugar, tobacco, coffee, fruit, cotton	Sugar, tobacco, cigars, coffee, fruits	86,072,000
Portugal	Cereals, fruits, animals, wine, cork, fish	Cork, wool, sardines, hides, olive oil	42,728,000
Rumania	Cereals, livestock, salt, petroleum, timber	Cereals, livestock, timber, seeds	84,763,000
Russia, etc.	Cereals, flax, potatoes, timber, minerals	Timber, flax, wheat, metals	105,914,000
Salvador	Coffee, cacao, rubber, wood, sugar, henequen	Coffee, henequen, sugar, rubber	16,214,000
Siam	Rice, timber, tin	Rice, tin, teakwood	68,354,000
Spain	Cereals, beans, fruits, metals, coal	Wine, fruit, olive oil, iron ore	230,050,000
Sweden	Roots, hay, timber, iron	Timber, wood work, pulp, paper, iron	301,881,000
Switzerland	Textiles, dairy products, watches, clocks	Dairy products, textiles, time pieces	309,929,000
Turkey	Tobacco, cereals, fruits, wool, mohair, nuts	Carpets, wool, mohair, nuts	14,866,000
Un. of So. Afr.	Cereals, livestock, gold, diamonds	Gold, diamonds, wool	122,726,000
United States	Cereals, cotton, minerals, animals, food products, iron and steel goods	Cotton, iron and steel goods, breadstuffs, meat, dairy products	4,167,493,000
Uruguay	Livestock, cereals	Meat, wool, hides	61,500,000
Venezuela	Coffee, cacao, sugar, rubber, minerals	Coffee, cacao, rubber, hides, cattle	26,162,000
Yugoslavia	Fruits, wood, tobacco, silk, cereals, animals	Maize, animals, prunes, timber	49,919,000

PRINCIPAL COUNTRIES OF THE WORLD

Countries	Chief Imports	Total Value of Imports	Railroad Mileage	Chief Seaports
Alaska		$31,146,000	818	
Algeria	Automobiles, paper, clothing, sugar, petroleum	155,644,000	2,722	Algiers
Argentina	Textiles, iron and steel, foodstuffs, oils, glassware	564,244,000	21,935	Buenos Aires
Australia	Textiles, machinery, metal manufactures, clothing	422,803,000	26,202	Sydney, Melbourne
Austria	Foodstuffs, textiles, building materials, fuel	374,615,000	4,125	
Belgium	Wheat and flour, wool, machinery	655,005,000	5,686	Antwerp
Bolivia	Foodstuffs, textiles, clothing, hardware	13,774,000	1,401	
Brazil	Wheat, iron and steel goods, coal, cotton goods	213,992,000	18,110	Santos, Rio de Janeiro
Bulgaria	Textiles, metals, machinery, skins, oils	27,791,000	1,829	Varna
Canada	Manufactures of iron and steel, textiles, coal, sugar	885,778,000	39,771	Montreal, Vancouver
Ceylon	Rice, cotton goods, coal, sugar	91,384,000	732	Colombo
Chile	Textiles, metal goods, machinery, chemicals, sugar	78,789,000	5,102	Valparaiso, Antofagasta
China	Cotton goods, rice, machinery, metals	799,236,000	6,818	Shanghai, Canton
Columbia	Cotton goods, metals, foodstuffs, drugs	85,040,000	926	Barranquilla
Costa Rico	Cotton goods, flour, iron and steel, cattle	8,345,000	410	Limon
Cuba	Foodstuffs, textiles, machinery, chemicals	180,303,000	3,020	Havana
Czechoslovakia	Cotton and woolen goods, cereals, fats and oils	299,478,000	8,718	
Denmark	Textiles, hardware, coal, cereals	325,292,000	3,092	Copenhagen
Dominican Rep.	Foodstuffs, cotton goods, iron and steel goods	14,317,000	408	Santo Domingo
Dutch E. Indies	Cotton goods, iron and steel goods	266,052,000	2,011	Batavia
Ecuador	Textiles, foodstuffs, machinery, clothing	9,284,000	413	Guayaquil
Esthonia	Coal, salt, sugar, fertilizers, sugar	27,050,000	769	Reval
Egypt	Cereals, wood, coal, animal products, textiles	212,445,000	3,065	Alexandria
Finland	Cereals, coffee, tea, sugar, metals, machinery	123,616,000	2,660	Helsingfors
France	Coal, coke, cereals, cotton, wool, oil seeds, machinery, petroleum	1,982,926,000	33,568	Marseille, Havre
Germany	Cotton, wool, copper, iron ore, skins, hides	1,448,587,000	35,209	Hamburg, Bremen
Great Britain	Cotton, wool, cereals, meats, iron ore, petroleum,	5,023,229,000	23,734	Liverpool, London
Greece	Foodstuffs, textiles, metals, chemicals [timber	102,003,000	1,983	Piræus, Salonica
Guatemala	Cotton, iron and steel, machinery	13,763,000	478	Puerto Barrios
Haiti	Cotton goods, sacks, machinery	14,158,000	112	Port au Prince
Hawaii	Foodstuffs, clothing, machinery	75,106,000	969	Honolulu
Honduras	Cotton goods, foodstuffs, machinery	14,342,000	556	Puerto Cortes
Hungary	Cotton goods, wood work, woolens, coal, paper	117,287,000	4,493	
India	Cotton goods, metals, ores, machinery, sugar	706,132,000	37,265	Calcutta, Bombay
Irish Free State	Textiles, machinery, foodstuffs	*	2,700	Dublin
Italy	Wheat, coal, cotton, wool, fish, iron and steel	791,404,000	12,885	Genoa, Naples, Trieste
Japan	Cotton, iron, machinery, foodstuffs, oil cake	1,132,110,000	8,081	Yokohama, Kobe
Latvia	Textiles, foodstuffs, coal, machinery	40,891,000	1,825	Riga
Lithuania	Textiles, food products, agricultural machinery	15,663,000	1,550	Memel
Mexico	Textiles, machinery, hardware	178,239,000	16,442	Vera Cruz, Tampico
Morocco	Sugar, cotton goods, machinery	80,992,000	840	Tangier
Netherlands	Textiles, cereals, flour, iron and steel, coal, wood	785,617,000	2,380	Rotterdam, Amsterdam
Newfoundland	Textiles, flour, coal, hardware, machinery	19,123,000	952	St. Johns
New Zealand	Textiles, metal manuf'r's, clothing, oils, sugar, drugs	198,943,000	3,156	Auckland, Wellington
Nicaragua	Cotton goods, flour, chemicals, iron and steel	5,124,000	169	Corinto
Norway	Breadstuffs, textiles, minerals, vehicles	229,959,000	2,141	Oslo, Bergen
Panama	Cottons, iron and steel, flour, mineral oils	10,397,000	301	Colon
Paraguay	Textiles, foodstuffs, hardware	4,562,000	308	
Persia	Sugar, cotton goods, tea	56,208,000	350	Bushire
Peru	Foodstuffs, hardware, textiles, jute	58,812,000	1,997	Callao
Philippines	Cottons, iron and steel goods	87,500,000	803	Manila
Poland	Textiles, foodstuffs, machinery	215,479,000	9,541	Danzig (free city)
Porto Rico	Cotton goods, machinery	84,467,000	339	San Juan
Portugal	Coal, cotton goods, fish, rice, fertilizers	132,907,000	2,128	Lisbon, Oporto
Rumania	Textiles, machinery, leather, sugar, rubber, chem-	82,229,000	7,325	Galatz
Russia, etc.	Foodstuffs, machinery, textiles, drugs [icals	92,187,000	42,504	Leningrad, Vladivostock
Salvador	Cottons, hardware, flour, drugs, chemicals	8,842,000	260	Acajutla
Siam	Cotton goods, foodstuffs, metal goods, tobacco	60,909,000	1,376	Bangkok
Spain	Foodstuffs, machinery, cottons, hardware	442,192,000	9,842	Barcelona, Valencia
Sweden	Coal, metal goods, textiles, hides	291,533,000	9,439	Göteborg, Stockholm
Switzerland	Foodstuffs, textiles, metals, timber	401,980,000	3,586	
Turkey	Cottons, cereals, woolen goods, oils [ment	43,116,000	3,340	Constantinople
Un. of So. Afr.	Textiles, clothing, machinery, oils, electrical equip-	209,180,000	10,890	Cape Town
United States	Silk, sugar, wool, coffee, hides and skins, rubber, fibers, oils	3,792,066,000	262,544	New York, New Orleans Philadelphia
Uruguay	Textiles, machinery, foodstuffs	64,929,000	1,660	Montevideo
Venezuela	Textiles, machinery, foodstuffs	15,772,000	646	La Guaira
Yugoslavia	Foodstuffs, chemicals, machinery, metals	87,120,000	5,696	Fiume (in Italy)

8. POPULATION OF CITIES IN THE UNITED STATES AND ITS DEPENDENCIES

Cities having more than 25,000 People, together with Others Mentioned in the Text.

	Pop. 1920	Pop. 1910
Akron, Ohio	208,435	69,067
Alameda, Calif.	28,806	23,383
Albany, N.Y.	113,344	100,253
Albuquerque, N.Mex.	15,157	11,020
Allentown, Pa.	73,502	51,913
Altoona, Pa.	60,331	52,127
Amsterdam, N.Y.	33,524	31,267
Anaconda, Mont.	11,668	10,134
Anderson, Ind.	29,767	22,476
Annapolis, Md.	11,214	8,609
Ann Arbor, Mich.	19,516	14,817
Asheville, N.C.	28,504	18,762
Astoria, Oregon	14,027	9,599
Atlanta, Ga.	200,616	154,839
Atlantic City, N.J.	50,707	46,150
Attleboro, Mass.	19,731	16,215
Auburn, N.Y.	36,192	34,668
Augusta, Ga.	52,548	41,040
Augusta, Maine	14,114	13,211
Aurora, Ill.	36,397	29,807
Austin, Tex.	34,876	29,860
Baltimore, Md.	733,826	558,485
Bangor, Maine	25,978	24,803
Baton Rouge, La.	21,782	14,897
Battle Creek, Mich.	36,164	25,267
Bay City, Mich.	47,554	45,166
Bayonne, N.J.	76,754	55,545
Beaumont, Tex.	40,422	20,640
Bellingham, Wash.	25,585	24,298
Berkeley, Calif.	56,036	40,434
Bethlehem, Pa.	50,358	12,837
Billings, Mont.	15,100	10,031
Binghamton, N.Y.	66,800	48,443
Birmingham, Ala.	178,806	132,685
Bisbee, Ariz.	9,205	9,019
Bismarck, N. Dak.	7,122	5,443
Bloomington, Ill.	28,725	25,768
Boise, Idaho	21,393	17,358
Boston, Mass.	748,060	670,585
Braddock, Pa.	20,879	19,357
Bridgeport, Conn.	143,555	102,054
Brockton, Mass.	66,254	56,878
Brookline, Mass.	37,748	27,792
Buffalo, N.Y.	506,775	423,715
Burlington, Iowa	24,057	24,324
Burlington, Vt.	22,779	20,468
Butte, Mont.	41,611	39,165
Cambridge, Mass.	109,694	104,839
Camden, N.J.	116,309	94,538
Canton, Ohio	87,091	50,217
Carson City, Nev.	1,685	2,466
Casper, Wyo.	11,447	2,639
Cedar Rapids, Iowa	45,566	32,811
Charleston, S.C.	67,957	58,833
Charleston, W. Va.	39,608	22,996
Charlotte, N.C.	46,338	34,014
Chattanooga, Tenn.	57,895	44,604
Chelsea, Mass.	43,184	32,452
Chester, Pa.	58,030	38,537
Cheyenne, Wyo.	13,829	11,320
Chicago, Ill.	2,701,705	2,185,283
Chicopee, Mass.	36,214	25,401
Cicero, Ill.	44,995	14,557
Cincinnati, Ohio	401,247	363,591
Clarksburg, W. Va.	27,869	9,201
Cleveland, Ohio	796,841	560,663
Clifton, N. J.	26,470	11,869
Clinton, Iowa	24,151	25,577
Cohoes, N.Y.	22,987	24,709
Colorado Spr's, Colo.	30,105	29,078
Columbia, S.C.	37,524	26,319
Columbus, Ga.	31,125	20,554
Columbus, Ohio	237,031	181,511
Concord, N.H.	22,167	21,497
Council Bluffs, Iowa	36,162	29,292
Covington, Ky.	57,121	53,270
Cranston, R.I.	29,407	21,107
Cumberland, Md.	29,837	21,839
Dallas, Tex.	158,976	92,104
Danville, Ill.	33,776	27,871
Danville, Va.	21,539	19,020
Davenport, Iowa	56,727	43,028
Dayton, Ohio	152,559	116,577
Decatur, Ill.	43,818	31,140
Denver, Colo.	256,491	213,381
Des Moines, Iowa	126,468	86,368
Detroit, Mich.	993,678	465,766
Dover, Del.	4,042	3,720
Dubuque, Iowa	39,141	38,494
Duluth, Minn.	98,917	78,466
Durham, N.C.	21,719	18,241
East Chicago, Ind.	35,967	19,098
East Cleveland, Ohio	27,292	9,179
East Liverpool, Ohio	21,411	20,387
Easton, Pa.	33,813	28,523
East Orange, N.J.	50,710	34,371
East St. Louis, Ill.	66,767	58,547
Elgin, Ill.	27,454	25,976
Elizabeth, N.J.	95,783	73,409
Elmira, N.Y.	45,393	37,176
El Paso, Tex.	77,560	39,279
Erie, Pa.	93,372	66,525
Evanston, Ill.	37,234	24,978
Evansville, Ind.	85,264	69,647
Everett, Mass.	40,120	33,484
Everett, Wash.	27,644	24,814
Fall River, Mass.	120,485	119,295
Fargo, N. Dak.	21,961	14,331
Fitchburg, Mass.	41,029	37,826
Flint, Mich.	91,599	38,550
Fort Smith, Ark.	28,870	23,975
Fort Wayne, Ind.	86,549	63,933
Fort Worth, Tex.	106,482	73,312
Frankfort, Ky.	9,805	10,465
Fresno, Calif.	45,086	24,892
Galveston, Tex.	44,255	36,981
Gary, Ind.	55,378	16,802
Glens Falls, N.Y.	16,638	15,243
Gloucester, Mass.	22,947	24,398
Gloversville, N.Y.	22,075	20,642
Grand Rapids, Mich.	137,634	112,571
Great Falls, Mont.	24,121	13,948
Green Bay, Wis.	31,017	25,236
Hagerstown, Md.	28,064	16,507
Hamilton, Ohio	39,675	35,279
Hammond, Ind.	36,004	20,925
Hamtramck, Mich.	48,615	3,559
Harrisburg, Pa.	75,917	64,186
Hartford, Conn.	138,036	98,915
Haverhill, Mass.	53,884	44,115
Hazleton, Pa.	32,277	25,452
Helena, Mont.	12,037	12,515
Highland Park, Mich.	46,499	4,120
Hoboken, N.J.	68,166	70,324
Holyoke, Mass.	60,203	57,730
Homestead, Pa.	20,452	18,713
Honolulu, Hawaii	83,327	52,183
Houston, Tex.	138,276	78,800
Huntington, W. Va.	50,177	31,161
Indianapolis, Ind.	314,194	233,650
Irvington, N.J.	25,480	11,877
Ithaca, N.Y.	17,004	14,802
Jackson, Mich.	48,374	31,433
Jackson, Miss.	22,817	21,262
Jacksonville, Fla.	91,558	57,699
Jamestown, N.Y.	38,917	31,297
Jefferson City, Mo.	14,490	11,850
Jersey City, N.J.	298,103	267,779
Johnstown, N.Y.	10,908	10,447
Johnstown, Pa.	67,327	55,482
Joliet, Ill.	38,442	34,670
Joplin, Mo.	29,902	32,073
Kalamazoo, Mich.	48,487	39,437
Kansas City, Kans.	101,177	82,331
Kansas City, Mo.	324,410	248,381
Kearney, N. J.	26,724	18,659
Kenosha, Wis.	40,472	21,371
Key West, Fla.	18,749	19,945
Kingston, N.Y.	26,688	25,908
Knoxville, Tenn.	77,818	36,346
Kokomo, Ind.	30,067	17,010
Lackawanna, N.Y.	17,918	14,549
La Crosse, Wis.	30,421	30,417
Lakewood, Ohio	41,732	15,181
Lancaster, Pa.	53,150	47,227
Lansing, Mich.	57,327	31,229
Lawrence, Mass.	94,270	85,892
Lewiston, Maine	31,791	26,247
Lexington, Ky.	41,534	35,099
Lima, Ohio	41,326	30,508
Lincoln, Nebr.	54,948	43,973
Little Rock, Ark.	65,142	45,941
Long Beach, Calif.	55,593	17,809
Lorain, Ohio	37,295	28,883
Los Angeles, Calif.	576,673	319,198
Louisville, Ky.	234,891	223,928
Lowell, Mass.	112,759	106,294
Lynchburg, Va.	30,070	29,494
Lynn, Mass.	99,148	89,336
McKeesport, Pa.	46,781	42,694
Macon, Ga.	52,995	40,665
Madison, Wis.	38,378	25,531
Malden, Mass.	49,103	44,404
Manchester, N.H.	78,384	70,063
Manila, P. I. ('19, '03)	283,613	219,928
Mansfield, Ohio	27,824	20,768
Marion, Ohio	27,891	18,232
Medford, Mass.	39,038	23,150
Memphis, Tenn.	162,351	131,105
Meriden, Conn.	29,867	27,265
Meridian, Miss.	23,399	23,285
Miami, Fla.	29,571	5,471
Milwaukee, Wis.	457,147	373,857
Minneapolis, Minn.	380,582	301,408
Missoula, Mont.	12,668	12,869
Mobile, Ala.	60,777	51,521
Moline, Ill.	30,734	24,199
Montclair, N.J.	28,810	21,550
Montgomery, Ala.	43,464	38,136
Montpelier, Vt.	7,125	7,856
Mount Vernon, N.Y.	42,726	30,919
Muncie, Ind.	36,524	24,005
Muskegon, Mich.	36,570	24,062
Muskogee, Okla.	30,277	25,278
Nashua, N.H.	28,379	26,005
Nashville, Tenn.	118,342	110,364
Natchez, Miss.	12,608	11,791
Newark, N.J.	414,524	347,469
Newark, Ohio	26,718	25,404
New Bedford, Mass.	121,217	96,652
New Britain, Conn.	59,316	43,916
New Brunswick, N.J.	32,779	23,388
Newburgh, N.Y.	30,366	27,805

	Pop. 1920	Pop. 1910
New Castle, Pa.	44,938	36,280
New Haven, Conn.	162,537	133,605
New London, Conn.	25,688	19,659
New Orleans, La.	387,219	339,075
Newport, Ky.	29,317	30,309
Newport, R. I.	30,255	27,149
Newport News, Va.	35,596	20,205
New Rochelle, N. Y.	36,213	28,867
Newton, Mass.	46,054	39,806
New York, N. Y.	5,620,048	4,766,883
Manhattan Boro.	2,284,103	2,331,542
Brooklyn "	2,018,356	1,634,351
Bronx "	732,016	430,980
Queens "	469,042	284,041
Richmond "	116,531	85,969
Niagara Falls, N. Y.	50,760	30,445
Norfolk, Va.	115,777	67,452
Norristown, Pa.	32,319	27,875
Norwalk, Conn.	27,743	24,211
Oakland, Calif.	216,261	150,174
Oak Park, Ill.	39,858	19,444
Ogden, Utah.	32,804	25,580
Ogdensburg, N. Y.	14,609	15,933
Oklahoma City, Okla.	91,295	64,205
Olympia, Wash.	7,795	6,996
Omaha, Nebr.	191,601	124,096
Orange, N. J.	33,268	29,630
Oshkosh, Wis.	33,162	33,062
Oswego, N. Y.	23,626	23,368
Paducah, Ky.	24,735	22,760
Pasadena, Calif.	45,354	30,291
Passaic, N. J.	63,841	54,773
Paterson, N. J.	135,875	125,600
Pawtucket, R. I.	64,248	51,622
Pensacola, Fla.	31,035	22,982
Peoria, Ill.	76,121	66,950
Perth Amboy, N. J.	41,707	32,121
Petersburg, Va.	31,012	24,127
Philadelphia, Pa.	1,823,779	1,549,008
Phoenix, Ariz.	29,053	11,134
Pierre, S. Dak.	3,209	3,656
Pittsburgh, Pa.	588,343	533,905
Pittsfield, Mass.	41,763	32,121
Plainfield, N. J.	27,700	20,550
Pocatello, Idaho.	15,001	9,110
Ponce, P. R.	41,561	35,027
Pontiac, Mich.	34,273	14,532
Port Huron, Mich.	25,944	18,863
Portland, Maine.	69,272	58,571
Portland, Oregon.	258,288	207,214
Portsmouth, N. H.	13,569	11,269
Portsmouth, Ohio.	33,011	23,481
Portsmouth, Va.	54,387	33,190
Pottsville, Pa.	21,876	20,236
Poughkeepsie, N. Y.	35,000	27,936
Providence, R. I.	237,595	224,326
Pueblo, Colo.	43,050	41,747
Quincy, Ill.	35,978	36,587
Quincy, Mass.	47,876	32,642
Racine, Wis.	58,593	38,002
Raleigh, N. C.	24,418	19,218
Reading, Pa.	107,784	96,071
Reno, Nev.	12,016	10,867
Revere, Mass.	28,823	18,219
Richmond, Ind.	26,765	22,324
Richmond, Va.	171,667	127,628
Riverside, Calif.	19,341	15,212
Roanoke, Va.	50,842	34,874
Rochester, N. Y.	295,750	218,149
Rockford, Ill.	65,651	45,401
Rock Island, Ill.	35,177	24,335
Rome, N. Y.	26,341	20,497
Rutland, Vt.	14,954	13,546
Sacramento, Calif.	65,908	44,696
Saginaw, Mich.	61,903	50,510
St. Augustine, Fla.	6,192	5,494
St. Joseph, Mo.	77,939	77,403
St. Louis, Mo.	772,897	687,029
St. Paul, Minn.	234,698	214,744
Salem, Mass.	42,529	43,697
Salem, Oregon	17,679	14,094
Salt Lake City, Utah	118,110	92,777
San Antonio, Tex.	161,379	96,614
San Diego, Calif.	74,683	39,578
San Francisco, Calif.	506,676	416,912
San Jose, Calif.	39,642	28,946
San Juan, P. R.	70,707	49,000
Santa Barbara, Calif.	19,441	11,659
Santa Fe, N. Mex.	7,236	5,072
Savannah, Ga.	83,252	65,064
Schenectady, N. Y.	88,723	72,826
Scranton, Pa.	137,783	129,867
Seattle, Wash.	315,312	237,194
Sheboygan, Wis.	30,955	26,398
Sheridan, Wyo.	9,175	8,408
Shreveport, La.	43,874	28,015
Sioux City, Iowa.	71,227	47,828
Sioux Falls, S. Dak.	25,202	14,094
Somerville, Mass.	93,091	77,236
South Bend, Ind.	70,983	53,684
Spartanburg, S. C.	22,638	17,517
Spokane, Wash.	104,437	104,402
Springfield, Ill.	59,183	51,678
Springfield, Mass.	129,614	88,926
Springfield, Mo.	39,631	35,201
Springfield, Ohio.	60,840	46,921
Stamford, Conn.	35,096	25,138
Steubenville, Ohio.	28,508	22,391
Stockton, Calif.	40,296	23,253
Superior, Wis.	39,671	40,384
Syracuse, N. Y.	171,717	137,249
Tacoma, Wash.	96,965	83,743
Tallahassee, Fla.	5,637	5,018
Tampa, Fla.	51,608	37,782
Taunton, Mass.	37,137	34,259
Terre Haute, Ind.	66,083	58,157
Toledo, Ohio	243,164	168,497
Topeka, Kans.	50,022	43,684
Trenton, N. J.	119,289	96,815
Trinidad, Colo.	10,906	10,204
Troy, N. Y.	72,013	76,813
Tucson, Ariz.	20,292	13,193
Tulsa, Okla.	72,075	18,182
Utica, N. Y.	94,156	74,419
Vicksburg, Miss.	18,072	20,814
Waco, Tex.	38,500	26,425
Walla Walla, Wash.	15,503	19,364
Waltham, Mass.	30,915	27,834
Warren, Ohio	27,050	11,081
Washington, D. C.	437,571	331,069
Waterbury, Conn.	91,715	73,141
Waterloo, Iowa.	36,230	26,693
Watertown, N. Y.	31,285	26,730
West Hoboken, N. J.	40,074	35,403
West New York, N. J.	29,926	13,560
Wheeling, W. Va.	56,208	41,641
Wichita, Kans.	72,217	52,450
Wichita Falls, Tex.	40,079	8,200
Wilkes-Barre, Pa.	73,833	67,105
Williamsport, Pa.	36,198	31,860
Wilmington, Del.	110,168	87,411
Wilmington, N. C.	33,372	25,748
Winston-Salem, N. C.	48,395	22,700
Woonsocket, R. I.	43,496	38,125
Worcester, Mass.	179,754	145,986
Yakima, Wash.	18,539	14,082
Yonkers, N. Y.	100,176	79,803
York, Pa.	47,512	44,750
Youngstown, Ohio.	132,358	79,066
Zanesville, Ohio.	29,569	28,026

9. POPULATION OF CITIES IN FOREIGN COUNTRIES

Cities having more than 250,000 People, together with Others Mentioned in the Text

Aberdeen, Scotland	159,000	('21)
Adelaide, Australia	261,000	('21)
Aleppo, Syria	140,000	
Alexandria, Egypt	445,000	('17)
Algiers, Algeria	207,000	('21)
Amiens, France	93,000	('21)
Amsterdam, Neth.	647,000	('20)
Antwerp, Belgium	304,000	('21)
Archangel, Russia	45,000	('21)
Arequipa, Peru	35,000	('20)
Astrakhan, Russia	123,000	('21)
Asuncion, Paraguay	100,000	('20)
Athens, Greece	293,000	('20)
Auckland, New Zealand	164,000	('22)
Augsburg, Germany	155,000	('19)
Bagdad, Iraq	250,000	('20)
Bahia, Brazil	283,000	('20)
Baku, Azerbaijan, Rus.	263,000	('21)
Ballarat, Australia	39,000	('21)
Bangkok, Siam	630,000	('20)
Barcelona, Spain	710,000	('20)
Barmen, Germany	156,000	('19)
Barranquilla, Colombia	65,000	('21)
Basel, Switzerland	136,000	('20)
Batavia, Java	139,000	('20)
Beirut, Syria	80,000	
Belfast, Nor. Ireland	425,000	('22)
Belgrade, Yugoslavia	120,000	('19)
Benares, India	198,000	('21)
Bergen, Norway	91,000	('20)
Berlin, Germany	3,804,000	('19)
Bern, Switzerland	105,000	('20)
Bilbao, Spain	113,000	('20)
Birmingham, England	919,000	('21)
Bogota, Colombia	160,000	('21)
Bombay, India	1,174,000	('21)
Bordeaux, France	267,000	('21)
Boulogne, France	55,000	('21)
Bradford, England	286,000	('21)
Bremen, Germany	270,000	('19)
Breslau, Germany	528,000	('19)
Brest, France	74,000	('21)
Brisbane, Australia	210,000	('21)
Bristol, England	377,000	('21)
Brussels, Belgium	775,000	('21)
Bucharest, Rumania	309,000	('17)
Budapest, Hungary	1,185,000	('21)
Buenos Aires, Argent.	1,720,000	('22)
Cairo, Egypt	791,000	('17)
Calais, France	73,000	('21)
Calcutta, India	1,328,000	('21)
Calgary, Canada	63,000	('21)
Callao, Peru	53,000	('20)
Canton, China	900,000	('21)
Cape Town, S. Africa	207,000	('21)
Caracas, Venezuela	92,000	('20)
Cardiff, Wales	200,000	('21)
Cartagena, Spain	97,000	('20)
Catania, Italy	255,000	('21)
Changsha, China	536,000	('21)

Chemnitz, Germany	304,000	('19)
Cherbourg, France	38,000	('21)
Chungking, China	497,000	('21)
Cologne, Germany	634,000	('19)
Colombo, Ceylon	244,000	('21)
Colon, Panama	31,000	('20)
Constantinople, Turk.	1,000,000	
Copenhagen, Denmark	561,000	('16)
Crefeld, Germany	124,000	('19)
Dairen, Manchuria	239,000	('20)
Damascus, Syria	170,000	
Danzig, Danzig	195,000	('23)
Delhi, India	304,000	('21)
Dortmund, Germany	295,000	('19)
Dresden, Germany	529,000	('19)
Dublin, Irish Free State	427,000	('22)
Durban, South Africa	146,000	('21)
Dusseldorf, Germany	407,000	('19)
Edinburgh, Scotland	420,000	('21)
Edmonton, Canada	59,000	('21)
Elberfeld, Germany	157,000	('19)
Essen, Germany	439,000	('19)
Fiume, Italy	50,000	('23)
Florence, Italy	254,000	('21)
Foochow, China	320,000	('21)
Frankfort on Main, Ger.	433,000	('19)
Freetown, Sierra Leone	44,000	('21)
Galatz, Rumania	74,000	('17)
Geneva, Switzerland	135,000	('20)
Genoa, Italy	301,000	('21)
Georgetown, Br. Guiana	55,000	('21)
Glasgow, Scotland	1,034,000	('21)
Göteborg, Sweden	227,000	('22)
Grimsby, England	82,000	('21)
Guadalajara, Mexico	119,000	('10)
Guatemala, Guatemala	91,000	('21)
Guayaquil, Ecuador	100,000	('19)
Hague, Netherlands	355,000	('19)
Halifax, Canada	58,000	('21)
Hamburg, Germany	986,000	('19)
Hamilton, Canada	114,000	('21)
Hangchow, China	892,000	('21)
Hankow, China	1,468,000	('20)
Hanoi, Fr. Indo-China	119,000	('21)
Hanover, Germany	393,000	('19)
Harbin, Manchuria	156,000	('21)
Havana, Cuba	364,000	('20)
Havre, France	163,000	('21)
Heidelberg, Germany	70,000	('19)
Helsingfors, Finland	198,000	('20)
Hobart, Tasmania	52,000	('21)
Hull, England	287,000	('21)
Hyderabad, India	404,000	('21)
Innsbruck, Austria	56,000	('20)
Iquique, Chile	37,000	('20)
Irkutsk, Siberia	104,000	('21)
Jerusalem, Palestine	63,000	('22)
Johannesburg, S. Af.	284,000	('21)
Kabul, Afghanistan	150,000	
Karachi, India	217,000	('21)
Kashgar, Sinkiang	60,000	
Kharkof, Russia	284,000	('21)
Khartum, Ang.-Eg. Sud.	31,000	
Kief, Russia	366,000	('21)
Kiel, Germany	205,000	('19)
Kimberley, S. Africa	39,000	('21)
Kingston, Jamaica	63,000	('21)
Kobe, Japan	609,000	('20)
Königsberg, Germany	261,000	('19)
Kovno, Lithuania	90,000	('14)
Krakow, Poland	181,000	('21)
Kyoto, Japan	591,000	('20)
La Paz, Bolivia	107,000	('18)
La Plata, Argentina	90,000	('14)
Lassa, Tibet	20,000	
Leeds, England	458,000	('21)
Leghorn, Italy	115,000	('21)
Leicester, England	234,000	('21)
Leipzig, Germany	604,000	('19)
Lemberg, Poland	219,000	('21)
Leningrad, Russia	1,067,000	('23)
Liege, Belgium	165,000	('21)
Lille, France	201,000	('21)
Lima, Peru	176,000	('20)
Limoges, France	90,000	('21)
Lisbon, Portugal	490,000	('20)
Liverpool, England	803,000	('21)
Lodz, Poland	452,000	('21)
London, England	7,476,000	('21)
Lucknow, India	241,000	('21)
Lyon, France	562,000	('21)
Madras, India	527,000	('21)
Madrid, Spain	751,000	('20)
Magdeburg, Germany	286,000	('19)
Manaos, Brazil	76,000	('20)
Manchester, England	731,000	('21)
Mandalay, Burma	149,000	('21)
Maracaibo, Venezuela	47,000	('20)
Marseille, France	586,000	('21)
Mekka, Hedjaz	70,000	
Melbourne, Australia	795,000	('21)
Messina, Italy	177,000	('21)
Mexico, Mexico	1,080,000	('10)
Milan, Italy	718,000	('21)
Mombasa, Kenya	40,000	('21)
Monterey, Mexico	74,000	('10)
Montevideo, Uruguay	351,000	('22)
Montreal, Canada	619,000	('21)
Moscow, Russia	1,028,000	('21)
Mukden, Manchuria	158,000	
Mulhouse, France	99,000	('21)
Munich, Germany	631,000	('19)
Nagoya, Japan	430,000	('20)
Nanking, China	380,000	('21)
Nantes, France	184,000	('21)
Naples, Italy	780,000	('21)
Newcastle, England	275,000	('21)
Nice, France	156,000	('21)
Ningpo, China	271,000	('21)
Nizhni Novgorod, Russia	88,000	('21)
Nottingham, England	263,000	('21)
Nuremberg, Germany	353,000	('19)
Odessa, Russia	432,000	('21)
Oporto, Portugal	203,000	('20)
Osaka, Japan	1,253,000	('20)
Oslo, Norway	258,000	('20)
Ottawa, Canada	108,000	('21)
Palermo, Italy	400,000	('21)
Panama, Panama	67,000	('20)
Para, Brazil	236,000	('20)
Paris, France	2,906,000	('21)
Peking, China	1,300,000	('21)
Pernambuco, Brazil	239,000	('20)
Perth, Australia	155,000	('21)
Pilsen, Czechoslovakia	88,000	('21)
Piræus, Greece	131,000	('20)
Pisa, Italy	68,000	('21)
Plymouth, England	210,000	('21)
Port Arthur, Canada	15,000	('21)
Port au Prince, Haiti	120,000	
Porto Alegre, Brazil	179,000	('20)
Port Said, Egypt	91,000	('17)
Portsmouth, England	247,000	('21)
Prague, Czechoslovakia	676,000	('21)
Puebla, Mexico	96,000	('10)
Quebec, Canada	95,000	('21)
Quito, Ecuador	81,000	('19)
Rangoon, Burma	342,000	('21)
Reggio, Italy	83,000	('21)
Regina, Canada	34,000	('21)
Reims, France	77,000	('21)
Reval, Esthonia	123,000	('22)
Riga, Latvia	185,000	('20)
Rio de Janeiro, Brazil	1,158,000	('20)
Rome, Italy	691,000	('21)
Rosario, Argentina	265,000	('22)
Rotterdam, Netherl'ds	516,000	('20)
Rouen, France	124,000	('21)
Saigon, Fr. Indo-China	83,000	('21)
St. Etienne, France	168,000	('21)
St. John, Canada	47,000	('21)
St. Johns, Newfoundland	34,000	('18)
Salonica, Greece	170,000	('20)
San Luis Potosi, Mexico	68,000	('10)
San Salvador, Salvador	81,000	('22)
Santiago, Chile	507,000	('20)
Santiago de Cuba, Cuba	70,000	('20)
Santo Domingo, Dom. R.	31,000	('21)
Santos, Brazil	103,000	('20)
São Paulo, Brazil	579,000	('20)
Sebastopol, Russia	73,000	('21)
Seoul, Chosen	250,000	('20)
Shanghai, China	1,500,000	('21)
Sheffield, England	491,000	('21)
Singapore, Straits Set.	387,000	('19)
Smyrna, Turkey	375,000	('12)
Sofia, Bulgaria	154,000	('20)
Soochow, China	500,000	('21)
Southampton, Eng.	161,000	('21)
Stettin, Germany	233,000	('19)
Stockholm, Sweden	422,000	('22)
Stoke upon Trent, Eng.	240,000	('21)
Strasbourg, France	167,000	('21)
Stuttgart, Germany	309,000	('19)
Sydney, Australia	898,000	('21)
Sydney, Canada	23,000	('21)
Tabriz, Persia	200,000	
Taganrog, Russia	68,000	('13)
Tampico, Mexico	18,000	
Tananarivo, Madagascar	63,000	('11)
Tangier, Morocco	50,000	('21)
Tashkent, Turkestan.	245,000	('21)
Teheran, Persia	220,000	
Tientsin, China	800,000	('21)
Tiflis, Georgia	347,000	('15)
Tokyo, Japan	2,173,000	('20)
Tomsk, Siberia	119,000	('21)
Toronto, Canada	522,000	('21)
Toulouse, France	175,000	('21)
Tours, France	75,000	('21)
Trebizond, Turkey	55,000	
Trieste, Italy	239,000	('21)
Tripoli, Libia	73,000	
Trondhjem, Norway	55,000	('20)
Tucuman, Argentina.	91,000	('14)
Tunis, Tunis	172,000	('21)
Turin, Italy	502,000	('21)
Valencia, Spain	244,000	('20)
Valladolid, Spain	71,000	('18)
Valparaiso, Chile	182,000	('20)
Vancouver, Canada	117,000	('21)
Venice, Italy	172,000	('21)
Vera Cruz, Mexico	49,000	('10)
Victoria, Canada	39,000	('21)
Vienna, Austria	1,841,000	('20)
Vilna, Poland	215,000	('14)
Vladivostok, Far E., Rus.	90,000	
Warsaw, Poland	931,000	('21)
Wellington, New Zeal'd	111,000	('22)
West Ham, England	301,600	('21)
Winnipeg, Canada	179,000	('21)
Yarkand, Sinkiang	60,000	
Yokohoma, Japan	423,000	('20)
Zanzibar, Zanzibar	35,000	
Zürich, Switzerland	207,000	('20)

INDEX AND PRONUNCIATIONS

MARKINGS: **ā** in **lāte**, **ă** in **făt**, **â** in **câre**, **ä** in **fär**, **å** in **låst**, **ạ** in **fạll**, **ȧ** in **sofȧ**, **au** in **author**; **ċ** in **can**, **ç**=**s**, **ċh**=**sh**; **ē** in **mē**, **ĕ** in **rĕturn**, **ĕ** in **mĕt**, **bĕrry**, **e** in **veil**, **ē** in **tērm**; **ġ** in **ġem**, **g** in **get**; **ī** in **fīne**, **ĭ** in **tĭn**, **ï** in **polïce**; **K** = German *ch*; **n** = **ng**, **N** = **ng** in its effect (nasal) on the preceding vowel, but is not itself sounded; **ō** in **nōte**, **ŏ** in **ŏbey**, **ō** in **nŏt**, **ȯ** in **sȯft**, **ô** in **fôr**, **ȯ** in **sȯn**, **ọ** in **wọlf**, **ọ** in **dọ**, **o͞o** in **sch o͞ol**, **o͝o** in **w o͝ol**; **ş** = **z**; **t͟h** in **t͟hine**; **ū** in **tūne**, **ŭ** in **nŭt**, **û** in **bûrn**, **ụ** in **fụll**, **ụ** in **rụde** (= **ọ**), **ü** = French *u*, **ua** = **wa**, **ue** = **we**; **x** = **gz**; **ȳ** in **mȳ**, **y** in **hymn**. *Italic letters are silent.*

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GEOGRAPHY OF PENNSYLVANIA

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AND

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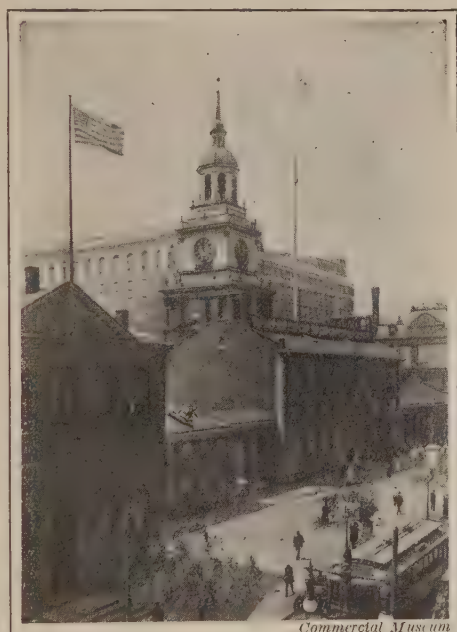
HISTORY

Founding of Pennsylvania. — Over 200 years ago William Penn, the founder of Pennsylvania, lived in England. In those days the governments, that is to say, the kings, had much more trouble to get money than do governments nowadays, and they were often forced to borrow from their wealthy friends and subjects. Thus it happened that when Penn's father, an admiral in the British navy, died, the king owed him about $80,000. The king, short of funds, as usual, offered to pay in land, which his soldiers and sailors and colonists had captured for him in the newly discovered continent of North America. This suited Penn, who was one of the leaders of the then persecuted society of Quakers. He saw that for $80,000 he could get land enough to furnish homes for as many of his Quaker friends as would care to cross the ocean. So he accepted the king's offer of a grant of territory west of the Delaware River, which the English had secured from the Dutch in 1664. The king insisted that this new colony be named for Penn's father. So it was called "Pennsylvania," which means "Penn's woods," — the land at that time being covered with thick forests. In 1682 Penn and his companions landed near the present site of Philadelphia and founded a colony.



Commercial Museum

Independence Hall, Philadelphia

Unlike some of the other colonial governors, Penn dealt fairly with the Indians. They became his firm friends, and the Quaker colony of Pennsylvania was never seriously molested by the savages. Remembering how unfairly the Quakers had been treated in England, Penn decreed that no one should be persecuted for his religious views. To insure against rulers who might oppress the people, he allowed the people to take part in the government through representatives whom they elected.

Immigration. — These favorable religious and political conditions soon made Pennsylvania a refuge for oppressed people from many parts of Europe. Among them in greatest numbers were English, Dutch, Swedes, Germans, Scotch-Irish, and Welsh. Somewhat later other English emigrants came to Philadelphia to work in the cotton and woolen mills. In the latter half of the eighteenth century many Germans sought refuge in Pennsylvania. These Germans in their own country had been good farmers, and most of them turned to farming here,

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Physical and Political
PENNSYLVANIA
Capital
County Seats
Other Cities and Towns
Steam Railroads
Electric Railroads
Canals thus
Scale of Statute Miles
0 10 20 30 40
24 MILES TO ONE INCH
LAKE ERIE
Erie
Jamestown
CHAUTAUQUA
CATTARAUGUS
ALLEGANY
McKEAN
Bradford
POTTER
Coudersport
ELK
CAMERON
Emporium
CLEARFIELD
Clearfield
JEFFERSON
Brookville
Punxsutawney
CLARION
Clarion
FOREST
Tionesta
VENANGO
Franklin
Oil City
WARREN
Warren
CRAWFORD
Meadville
ERIE
Erie
MERCER
Sharon
Farrell
LAWRENCE
New Castle
BUTLER
Butler
ARMSTRONG
Kittanning
INDIANA
Indiana
BEAVER
Beaver Falls
ALLEGHENY
Pittsburgh
WASHINGTON
Washington
Monongahela
Charleroi
GREENE
Waynesburg
FAYETTE
Uniontown
WESTMORELAND
Greensburg
Latrobe
Johnstown
CAMBRIA
Ebensburg
Altoona
BLAIR
Hollidaysburg
SOMERSET
Somerset
BEDFORD
Bedford
FULTON
HUNTINGDON
Huntingdon
MIFFLIN
JUNIATA
PERRY
Newport
DAUPHIN
Harrisburg
LEBANON
Lebanon
YORK
York
ADAMS
Gettysburg
LANCASTER
Lancaster
CUMBERLAND
Carlisle
Cumberland
Hagerstown
WASHINGTON
FRANKLIN
Chambersburg
Greencastle
Mercersburg
Waynesboro
Shippensburg
Mechanicsburg
Shamokin
Sunbury
Northumberland
Lewisburg
Milton
Williamsport
Lock Haven
Clearfield
Philipsburg
State College
Bellefonte
Tyrone
Hollidaysburg
Altoona
Johnstown
Somerset
Uniontown
Connellsville
Greensburg
Washington
Carnegie
Pittsburgh
Beaver
Butler
Oil City
Franklin
Meadville
Erie
Corry
Titusville
Oil City
Warren
Bradford
Kane
Ridgway
St. Marys
Johnsonburg
Emporium
Coudersport
Wellsboro
Mansfield
Towanda
Troy
Athens
Sayre
Tioga
Elmira
Corning
Hornell
Wellsville
Olean
Salamanca
Jamestown
Dunkirk
Fredonia
Westfield
Ripley
Conneaut
Ashtabula
Geneva
Meadville
Titusville
Oil City
Franklin
Warren
Bradford
Kane
Ridgway
St. Marys

Size of type indicates relative population of places
1,800,000 and over
Philadelphia
100,000 to 600,000
Scranton
50,000 to 100,000
Erie
10,000 to 50,000
Bradford
5,000 to 10,000
Titusville
Boroughs which are suburbs of larger places are not displayed in this group.
County Seats with less than 5,000 population Smethport
ELEVATIONS IN FEET
8000 AND OVER
2000 TO 8000
1500 TO 2000
1000 TO 1500
500 TO 1000
0 TO 500
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77°
76°
75°
42°
41°
40°
CHENANGO
DELAWARE
BROOME
TIOGA
CHEMUNG
STEUBEN
SUSQUEHANNA
BRADFORD
WAYNE
SULLIVAN
WYOMING
LACKAWANNA
LUZERNE
LYCOMING
COLUMBIA
MONTOUR
NORTHUMBERLAND
UNION
SNYDER
MIFFLIN
JUNIATA
PERRY
CUMBERLAND
DAUPHIN
LEBANON
LANCASTER
YORK
ADAMS
FREDERICK
CARROLL
BALTIMORE
HARFORD
CECIL
SCHUYLKILL
CARBON
MONROE
PIKE
WARREN
MORRIS
SUSSEX
HUNTERDON
SOMERSET
MERCER
BUCKS
MONTGOMERY
CHESTER
DELAWARE
LEHIGH
NORTHAMPTON
BERKS
LANCASTER
Binghamton
Elmira
Owego
Sayre
Towanda
Wilkes-Barre
Scranton
Carbondale
Honesdale
Pittston
Plymouth
Nanticoke
Hazleton
Shenandoah
Mahanoy City
Pottsville
Tamaqua
Williamsport
Lock Haven
Jersey Shore
Bloomsburg
Danville
Sunbury
Shamokin
Mt. Carmel
Lewisburg
Selinsgrove
Middleburg
Mifflinburg
Lewistown
Mifflintown
Huntingdon
Bedford
Everett
McConnellsburg
Chambersburg
Carlisle
Harrisburg
Steelton
Middletown
Mechanicsburg
Shippensburg
Newville
Gettysburg
Hanover
York
Columbia
Lancaster
Coatesville
West Chester
Phoenixville
Norristown
Conshohocken
Bristol
Philadelphia
Camden
Chester
Media
Darby
Wilmington
Elkton
Newark
Dover
Milford
Salem
Bridgeton
Millville
Vineland
Atlantic City
Cape May
Reading
Pottstown
Boyertown
Kutztown
Fleetwood
Hamburg
Allentown
Bethlehem
Easton
Phillipsburg
Belvidere
Flemington
Trenton
Lambertville
Doylestown
Quakertown
Perkasie
Sellersville
Souderton
Hatfield
Lansdale
North Wales
Ambler
Jenkintown
Abington
Germantown
Manayunk
Frankford
Kensington
Camden
Gloucester
Woodbury
Haddonfield
Merchantville
Riverton
Palmyra
Burlington
Bordentown
Trenton
Delaware River
Susquehanna River
Schuylkill River
Lehigh River
Juniata River
Allegheny Mts.
Blue Mts.
Kittatinny Mts.
Pocono Mts.
Chesapeake Bay
Greenwich
THE MATTHEWS-NORTHRUP WORKS, BUFFALO, N.Y.

and they settled mainly in the rich agricultural valleys in southeastern Pennsylvania.

Near the middle of the nineteenth century, large numbers of English and Welsh coal miners came to get work in the hard-coal fields of eastern Pennsylvania.

Recently the people who have come into Pennsylvania are from southern and eastern Europe, — Russia, Austria-Hungary, and Italy. In these countries wages are low and a great many people are very poor. To avoid persecution and to get work that paid better, thousands of Russian Jews have come to Pennsylvania. These Jews and the Italians have centered in Philadelphia. The Poles and Slavs have become our chief coal miners. So many of these emigrants have lately come to Pennsylvania that now nearly half of all the people in the state are foreign-born, or had one or both parents of foreign birth.

POSITION, FORM, AND SIZE

Position. — Pennsylvania is near the northeastern corner of the United States. It belongs to that group of states known as the Middle Atlantic States, and has always been known as the " Keystone " state, because it is the central state in the original thirteen states which form an irregular arch along the Atlantic coast.

Form. — Pennsylvania is nearly rectangular in shape. The eastern boundary, formed by the Delaware River, is irregular, and the line between Pennsylvania and Delaware is the arc of a circle. In the northwest corner is a small triangle that extends to Lake Erie. This piece of land was bought from the United States government to give Pennsylvania an outlet on the lake.

Size. — When Pennsylvania was being settled, Penn claimed that the king had given him all the land as far south as latitude 39° N. Find what towns are crossed by this line. Maryland claimed all the land as far north as latitude 40° N. A compromise was made at latitude 39° 43′ 26″ N. Find what towns are crossed by this line. Two Englishmen were brought over to survey the new boundary, and it has ever since been called " Mason and Dixon's line " after the surveyors. The northern boundary of Pennsylvania, except the lake shore, is in latitude 42° N. How far is this from Mason and Dixon's line?

From the Delaware River on the east the state reaches west to longitude 80° 31′ 36″ W. The greatest length of Pennsylvania is about equal to the distance by rail from Philadelphia to Pittsburgh. The fastest express train, leaving Philadelphia at nine o'clock in the morning, does not reach Pittsburgh until five o'clock at night. The area of the state is 45,126 square miles. It is not quite so large as New York, but is a little larger than Virginia, and is more than twice as large as New Jersey, Delaware, and Maryland put together. It would take nearly six states the size of Pennsylvania to cover the state of Texas.

Questions and Exercises. — 1. Why is Pennsylvania called the Keystone state?

2. What is the latitude of the southern boundary of Pennsylvania? Of the northern boundary?

3. How long does it take for one to go by train from Philadelphia to Pittsburgh?

4. What is the area of Pennsylvania? How does it compare in size with New York? With Texas? With Virginia?

RELIEF

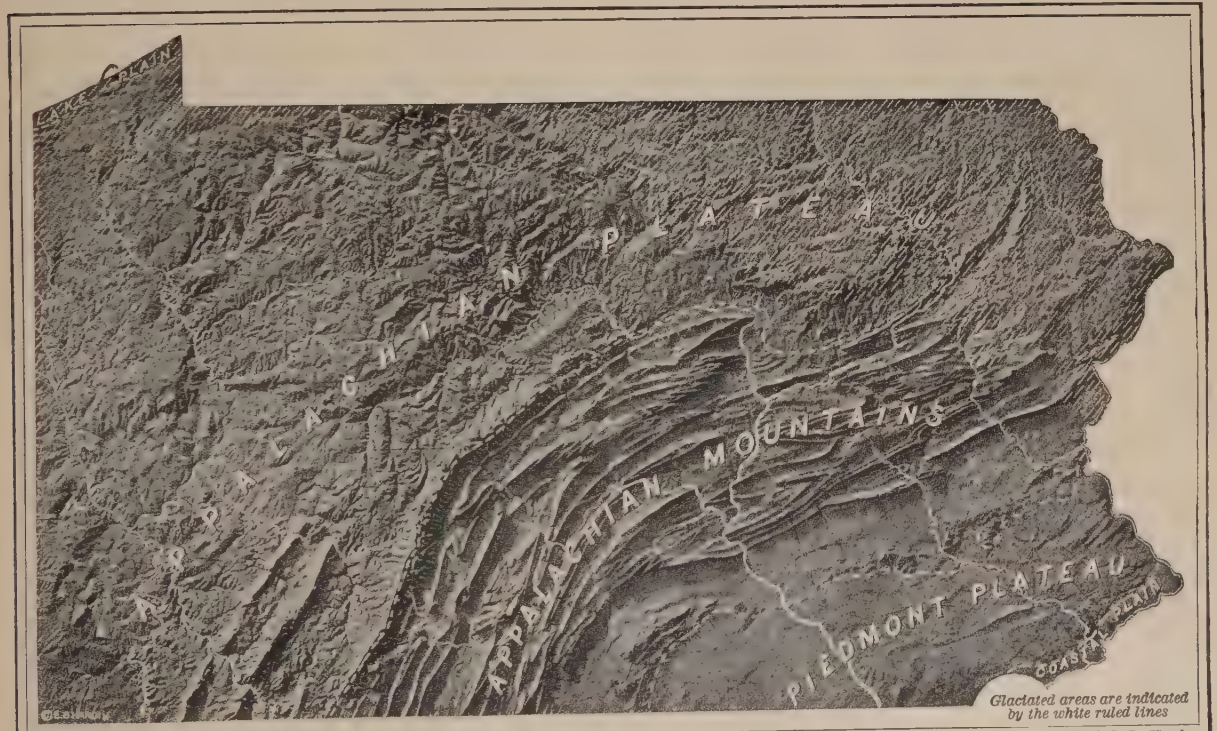
A very small area along the Delaware River, in the southeastern part of Pennsylvania, lies in the Atlantic Coastal Plain. In the northwestern part of the state a narrow belt along Lake Erie lies in the Lake Plains. With the exception of these two areas, Pennsylvania is included in three great belts crossing the state from northeast to southwest, — namely: (1) Piedmont Plateau, (2) Appalachian Mountains, (3) Appalachian Plateau (Secs. 47, 48, 49, 50).

The Piedmont Plateau. — The Piedmont Plateau occupies the southeastern part of Pennsylvania and includes about one ninth of the entire area of the state. It takes in all the land southeast of South Mountain. Locate South Mountain on the map. Low ridges of hard rock cross the Piedmont from northeast to southwest, while around them lie low, more level lands underlain by softer rocks. The combined area of these level tracts in the Piedmont is much greater than that of the ridges.

The ridge sections are not good farm land, because the layer of soil is too thin. Where the forests were cut off, the soil which had been held in place by the roots of the trees washed away so rapidly that in a short time the land could not be farmed profitably. So forests have been allowed to remain on most of the ridges.

In the level lands the weathered rock accumulates so much faster than the streams can carry it away, that the soil is often from 20 to 50 feet deep. Here the soil does not wash away so much, when the forests are removed. Therefore the level land has been cleared and used for farms. All of these farms are not equally fertile because of the variation in the character of the soils that have been formed from the different kinds of rock. For instance, when limestone weathers, it forms a soil rich in plant food, on which large crops grow. For this reason farmers are willing to pay a big price for farms in a limestone region. The Lancaster and Chester valleys are such regions. Where the underlying rock is sandstone or red shale, the soils are not so fertile; besides small gullies or washes form easily, and much of the best soil is carried away during rains. These soils are found over large areas in Bucks and Montgomery counties and in a long narrow strip along the eastern edge of South Mountain.

The Appalachian Mountains. — The settlers who pushed westward through the Piedmont found that it was bounded on the north-



Relief map of Pennsylvania

western side by a long, low ridge extending from Easton southwest in a fairly straight line to the Maryland boundary. This ridge we have already called South Mountain. At its highest point near the Maryland line it is 2100 feet above the sea; at other points it is much lower. Since it is formed of hard rock, its soils are thin and poor; and like the ridges in the Piedmont, most of it has been left in forest.

Southwest of Reading there is a gap 40 miles wide. The early settlers poured through the gap and found themselves in a broad flat valley from 10 to 20 miles wide. On the opposite side of the valley they could see the faint blue outline of another, higher ridge, and they named this ridge Blue Mountain because of its color. The valley they had entered they called the "Great Valley," and as they spread through it they found that it lay like a great trench all across the state between the two parallel ridges of South Mountain and Blue Mountain.

Later the settlers pushed farther west across Blue Mountain. They found that it was not an isolated ridge like South Mountain, but was the first of a series of parallel ridges that cross Pennsylvania from the northeastern corner to the Maryland boundary. This belt of ridges is from 30 to 50 miles wide. Along its western edge rises a great steep wall of rock known as the Allegheny escarpment. The broad belt between South Mountain and the Allegheny front or escarpment, including the Great Valley and the belt of ridges beyond Blue Mountain, is Pennsylvania's section of the Appalachian Mountains, and is known as the Ridge-and-Valley belt. It includes about one fourth of the area of the state.

The Ridge-and-Valley country is a series of parallel ridges, separated by deep, narrow valleys. The crests of the larger ridges are all of nearly the same height, — about 1800 to 2000 feet above the sea. If you should climb up to the top of one of these ridges and look across the country it would look like waves of the sea, or long windrows of hay.

The rocks which form the ridges weather slowly, and since the slopes are steep, the water carries the soil away almost as fast as it is formed. In many places the rock has been washed bare. Because of these conditions, these ridges are poor places for farming, and are still largely covered with the forests that were there when the first settlers came.

Of the valleys in this region, the Great Valley which the settlers first entered is the widest. Southwest of Harrisburg it is known as the Cumberland Valley, and east of Harrisburg as the Lebanon Valley. The southeastern half along the side of South Mountain is underlain by limestone and the soil is consequently deep and rich and the surface level. The farmers grow cultivated crops, as corn and potatoes, without fear that the rains will carry away the fertile top soil. The limestone, when crushed and spread on a road, makes it compact and smooth.

Although this soft limestone rock makes the best farming region, it has one disadvantage in the fact that the underlying stone is full of caverns and passages into which the water runs. There are few springs or surface streams; therefore, the crops are apt to suffer from drought because the water sinks far below the roots of the plants.

The northwestern half of this valley, next to Blue Mountain, is underlain by shale and slate. This half of the valley is a little more hilly and the soils are not so deep or rich as in the limestone region. The land therefore is not so good for farming. Consequently it is cheaper and more has been left in forests. In the eastern end of the valley drained by the Lehigh River the shale is used to make cement, and the slate is quarried and used for roofs and other purposes.

The narrow valleys lying between Blue Mountain and the Appalachian Plateau are somewhat like the Great Valley. However, they are not good farming sections because

they are so narrow and the soil is mostly from slate rock like the poorer half of the Great Valley. Moreover, the ridges shut off the valley farmer from easy communication with the outside world. For example, Blue Mountain can be crossed easily at only four places, where four large rivers — the Delaware, Lehigh, Schuylkill, and Susquehanna — have cut gorge-like passes through the mountains. The best known of these is the Delaware Water Gap. Travel and communication having been so inconvenient between different sides of a ridge, the people on opposite sides were strangers; they rarely saw or mingled with each other, and so each side set up its own separate county government, leaving the ridge as the county boundary. What boundaries between counties can you find which are formed by Blue Mountain? By South Mountain? By the Allegheny Front? Since travel is easy up and down the length of the valley, the counties are apt to be long and narrow.

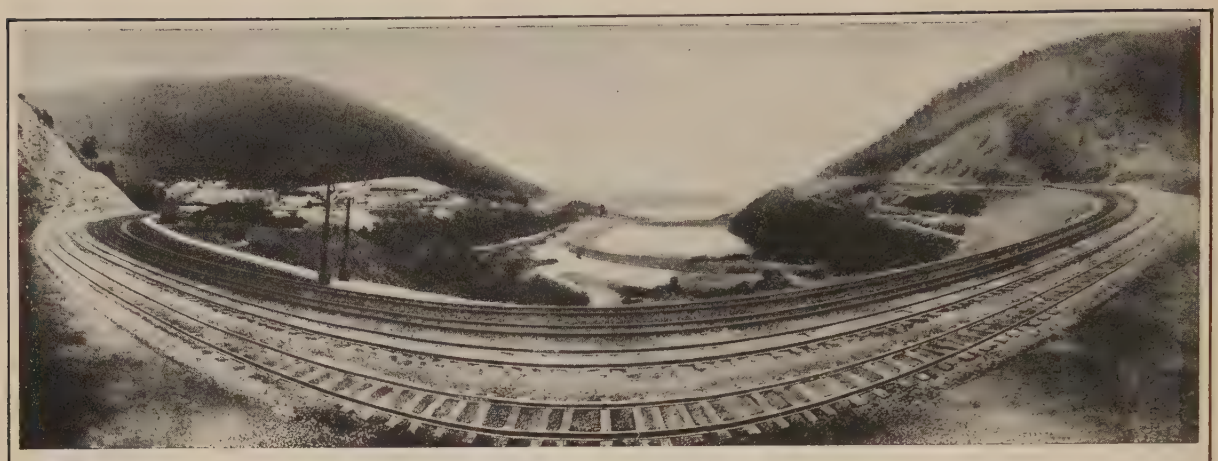
The ridges make it hard for the farmers living in the narrow valleys to haul their goods out to market. Moreover, the soils are too poor for the most profitable farming. Consequently few people live here, and they are less prosperous than the people in the Great Valley.

Although the ridges are poor for farming, they are noted for their great deposits of anthracite, which are found in the part of this district east of the Susquehanna River.

The Appalachian Plateau. — The Appalachian or Allegheny Plateau covers about two thirds of the entire area of Pennsylvania, and includes all of the state west of the Ridge-and-Valley belt except the narrow strip of land along Lake Erie. It is nearly twice as large as the Piedmont and the Ridge-and-Valley belt put together. This region is not a series of parallel ridges and valleys, but is a high plateau which slopes gently toward the west. Due to the westward slope its surface at the western end of Pennsylvania is only about 1000 to 1200 feet above sea level. The streams and the valleys of the Plateau region wind here and there in all directions, and the surface is a maze of hills and valleys. The valleys are deep and narrow, and are called young valleys (Sec. 16). The streams have had time to cut valleys but have not had time to widen them by wearing off their sides as the streams in the Piedmont have done. Most of the valleys of the Plateau are therefore deep and V-shaped, the bottom of these valleys being from 300 to 500 feet below the level of the Plateau. Near the Ohio boundary the Plateau, especially in the southwestern part of Pennsylvania, is less rugged.

Railroad route along the Lehigh River, in the Blue Mountains

The eastern border of the Plateau is a steep slope, or escarpment, called the Allegheny Front. Looking from the east this escarpment, deeply carved by streams, resembles a range of mountains, and is therefore generally known as the Allegheny



Horseshoe Curve, near Altoona

Mountains. The escarpment is from 2000 to about 3000 feet high, and the highest point in the whole state is on this wall at Blue Knob in Bedford County, which is 3136 feet above the sea. Even with our great locomotives of to-day, it is not easy to climb this steep barrier. The Pennsylvania Railroad near Altoona had to lay its tracks in the form of the famous "Horseshoe Curve" so that the grades might be made easier.

The great glacier (Secs. 30, 31, and 32) which at one time covered a large part of North America extended south far enough to reach over the northwestern and northeastern corners of Pennsylvania. It scraped much of the soil off the tops of the hills and deposited much of it in the valleys. This had the effect of making the land more nearly level. In many places great masses of rocky materials, dumped into stream valleys, dammed the streams so that lakes were formed on the upper side of the barriers. In the Pocono Plateau, which is a part of the Appalachian Plateau in the northeastern part of Pennsylvania, these lakes are very abundant. When the dammed-up streams flowed over the glacial drift that had blocked them, or ran out over some new course, beautiful waterfalls and cascades were formed. The beauty of the country containing these lakes and waterfalls has led a great many people to spend their summer vacations on the Pocono Plateau.

The value of the Appalachian Plateau as a farming section varies with the degree of ruggedness in the country. Many places over which the glacier passed were scraped bare of soil. On the tops of the hills the sandstone rocks decay so slowly that very little soil collects. Besides being shallow the soil is made up largely of sand, which does not give much nourishment to plants. The sides of the hills are so steep that it does not pay to farm them, and the valley floors are usually so narrow that there is not much farming land in them. The steepness of the land makes it hard for the farmer to haul his crops to market. Much more of the land in the Appalachian Plateau has, therefore, been allowed to remain in forests than in the Great Valley or the Piedmont. Only near the Ohio boundary do farms cover a large part of the surface.

The ruggedness of the country has hindered others besides farmers. The railroads, to avoid steep grades, have followed the turnings of the deep river valleys. What railroads in the Appalachian Plateau follow river valleys? People congregated in valleys in order to be near the railroads and the waterways so that they might have means of shipping whatever they had to sell. Also they could bring back clothing, food, and

other materials that they wanted. Cities have therefore grown up chiefly in the river valleys at points where they were wide enough to hold cities. Another reason for the people congregating in valleys is to work in the coal mines, for the seams of bituminous coal often outcrop on the sides of the valley.

Despite the advantages of the situation of these valley cities, they are in great danger of floods. The Plateau region has a greater rainfall than the other sections of Pennsylvania have. The heaviest rains come in the spring when the ground is frozen, and the slopes, many of them without any forests, are so steep that the water rushes down and floods the narrow valleys. In some cases lives are lost and much property is destroyed. Pittsburgh and other cities of the Ohio drainage basin are advocating the building of large storage reservoirs at the headwaters of the rivers. When a big flood comes these reservoirs would be able to hold much of the flood water. The gradual discharge of the water from these storage basins would also help to prevent excessive low water in the streams during the dry season of the year.

The Lake Plain. — In the northwestern corner of Pennsylvania, between the Appalachian Plateau and Lake Erie, lies a narrow strip of low land known as the Lake Plain. Lake Erie was once larger than it is now, and this strip of land was then part of the lake bottom and was entirely covered by water. When the lake shrank to its present size, the land was uncovered, leaving a level plain covered by a rich soil formed from the thick muds of the lake bottom. The Lake Plain is about 200 feet lower in elevation than the near-by parts of the Plateau, and its level surface and rich soil have made it excellent farm land. The cool waters of the lake warm very slowly in spring, keeping the air from warming too early in the season, so that the buds open quite late, and the danger of frost killing the young fruit buds is avoided. As a result the Lake Plain has become a great fruit section. It raises more grapes than all the rest of the state put together. It is said that the little town of Northeast in the Plain has shipped as many as sixty carloads of grapes in one day, — besides converting a large amount of the fruit into grape juice.

Questions and Exercises. — 1. What part of Pennsylvania lies in the Atlantic Coastal Plain? 2. What part lies in the Lake Plains? 3. In which great physical region does most of the state lie? 4. What are the three main divisions of this physical region?

5. Describe the Piedmont Plateau in Pennsylvania. 6. Locate some of the most fertile belts of this plateau.

7. Describe the Ridge-and-Valley belt of the state. 8. Where is the Great Valley?

9. Locate and describe the Allegheny Plateau.

Vineyard in the Lake Plain, Erie County

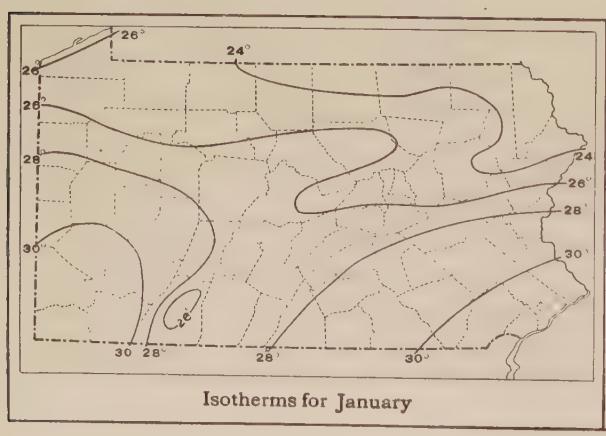
CLIMATE

Temperature. — The winters of Pennsylvania are cold and bracing. Every year from three to four feet of snow falls over most of the state. Frequently on the ridges and the higher parts of the Plateau over four feet falls. The isothermal map shows that the Appalachian Mountains and Appalachian Plateau, especially in the northern part of the state, are colder in winter and in summer than are the Piedmont and the Great Valley. The mean annual temperature of the Piedmont Plateau is about 52°; that of the Ridge-and-Valley belt is about 50°; and that of the Allegheny Plateau is about 46°.

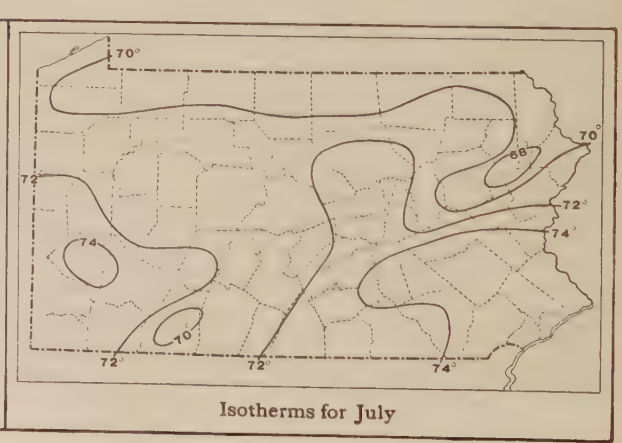
Although the winters are cold, the summers are long enough and warm enough to ripen many different kinds of crops. In the Piedmont and the Great Valley, the growing season, which is the time between the last killing frost in spring and the first killing frost in fall, usually lasts from five to six months. As you go north and west into the ridges and the Plateau, the growing season becomes shorter. In the rough part of the Plateau along the New York boundary it is somewhat less than five months. Such crops as wheat, oats, hay, and potatoes can be raised within a season of five or six months. Good crops of corn will ripen all over the state except in a few high, cool places in the Plateau near the New York boundary.

In autumn if you should visit the Ridge-and-Valley belt of Pennsylvania you might see the trees on the sides of the ridges still green and growing, while down in the valleys the leaves on the trees and the crops on the farms have been killed by a heavy frost. At night the cold air on the ridges, because it is heavier, drains down into the valley, giving it a frost and nipping the growing things, while the warm air, displaced, creeps up, giving a higher temperature to the green plants and trees on the higher slopes. This gentle current of cold air flowing down the slopes is known as the "down-the-mountain breeze." The vegetation of the slopes is protected from late frosts in spring just as it is protected from early frosts in the fall. Thus the fruit trees on the slopes in the Ridge-and-Valley belt are protected from unseasonable frosts about as much as are the fruit trees and grape vines along Lake Erie, and many farmers have started to raise apples and peaches on the mountain slopes of the state.

Rainfall. — Pennsylvania lies in a part of the United States that has a fairly heavy rainfall. Nearly every part of the state has about 40 inches annually. It is heaviest over most of the state during the spring and summer months just when it will do the most good for growing crops. The only places where the farms ever suffer much from drought are in the Great Valley and the Piedmont. In these regions, although the



Isotherms for January



Isotherms for July

rainfall is heavy in the summer when crops are growing, it is apt to come in big thunderstorms. There have been such thunder-showers in eastern Pennsylvania when seven inches of rain has fallen in twenty-four hours, followed by a long period of no rain at all, during which the crops suffered. It is fortunate that these torrential rains do not occur so often in the Plateau, or there would be many more floods than there are now. The rains here come in smaller amounts and at more frequent intervals.

Power plant on the Susquehanna, McCalls Ferry

Winds. — Pennsylvania is in the zone of prevailing westerlies. Throughout most of the state the wind blows chiefly from the northwest in winter and from the southwest in summer except when disturbed by storms (Secs. 61, 62).

Questions and Exercises. — 1. What part of Pennsylvania has the lowest mean annual temperature? 2. What part has the highest mean annual temperature?

3. What is the growing season? 4. In what part of the state is the growing season shortest? 5. In what part is it longest? 6. How long is it in your locality?

7. Explain why hillsides are freer from frosts than the valleys. 8. What is the bearing of this fact upon fruit growing?

9. What is the mean annual rainfall of Pennsylvania? 10. Which is the rainiest season?

11. From what direction do the prevailing winds blow in Pennsylvania?

DRAINAGE

Three chief river systems drain the state of Pennsylvania. These are (1) the Ohio River, (2) the Susquehanna River, (3) the Delaware River.

The Ohio system drains the western part of the state. The Ohio itself is navigable to Pittsburgh. Its two chief branches, the Monongahela and the Allegheny, have been made navigable for small boats by the building of dams to make the water deeper over the shallow parts of the stream bed. Beaver River is another important tributary of the Ohio.

The Susquehanna River crosses the central part of the state from New York to Maryland. With its large tributaries, the Juniata, the West Branch, and the North Branch, it drains the central part of the state. At McCalls Ferry and York Haven, below Harrisburg, large dams have been built across the Susquehanna to develop its water power. This power is now being used in Baltimore and near-by places to supply light, run trolley cars, and for other purposes.

The Delaware River, between Pennsylvania and New Jersey, drains a narrow belt in the eastern part of the state. This river is navigable for ocean vessels as far as Philadelphia and for small river steamers as far as Trenton. The two chief tributaries of the Delaware on the Pennsylvania side are the Lehigh and the Schuylkill rivers.

We have seen that the streams in the Allegheny Plateau flow in winding valleys that extend in every direction. In the Ridge-and-Valley belt, however, the main branches of the large streams, like the Susquehanna, flow down to the river in parallel lines. This is because each stream drains one of the

narrow valleys that lie between the parallel ridges. The large rivers flow across the ridges. Where they have cut through the ridges there are gateways through which men have built roads, railroads, and canals. If you look at the map, you will see that all over this section of the country railroads and canals have followed the rivers. The Lehigh Valley Canal from Easton to Mauch Chunk, and the Lehigh Valley Railroad both follow the Lehigh River. The Lackawanna Railroad crosses Blue Mountain through the Delaware Water Gap. The Pennsylvania Railroad crosses Blue Mountain, Second Mountain, and Peters Mountain through deep gaps a short distance north of Harrisburg. A canal and two railroads follow the Susquehanna River from Columbia to Nanticoke.

In parts of the state where the great glacier covered the land, the streams at many places were blocked by the glacial drift. Here lakes were formed. Small streams that have since run into these lakes dropped their load of mud there until now many of them have been partly filled up and are swamps.

Questions and Exercises. — 1. Draw a sketch map of Pennsylvania and show the most important rivers. Show by dotted lines the divides that bound the following drainage basins: Ohio, St. Lawrence, Susquehanna, and Delaware.

Camp of Yale Forest School, Milford

2. What railroads follow river valleys throughout much of their routes in Pennsylvania? 3. Account for the origin of most of the lakes of Pennsylvania.

FORESTS

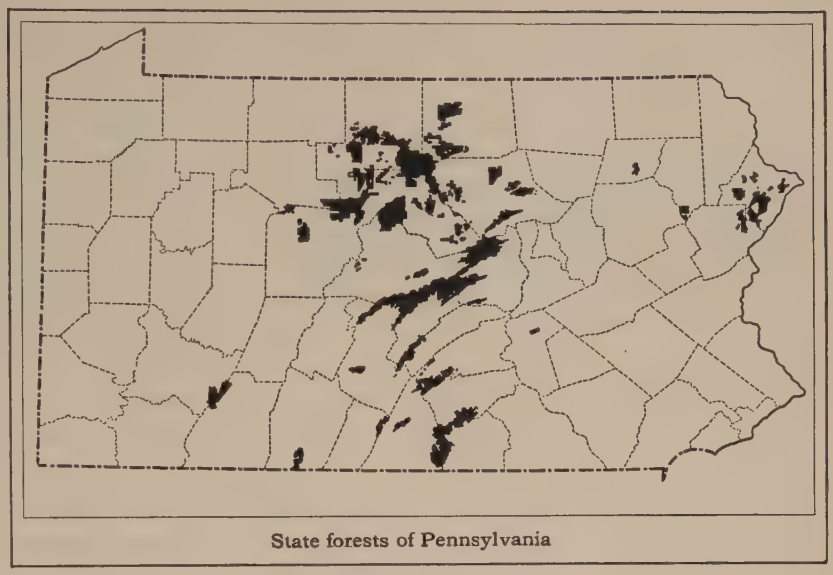
Original Forests. — Originally the entire state of Pennsylvania was covered with forests, made up of a great variety of trees. On the low lands the chief kinds of trees were oaks and chestnuts. Higher up on the ridges, where it was colder, evergreen trees were more numerous than the deciduous, or leaf-shedding, trees. The early settlers thought only of the rich soil in the forests and regarded the trees as something which hindered them from making a living, so they cut them down, rolled the logs into piles and burned them, without thinking of the future use to which the lumber might be put. This was especially true where the earliest settlers built homes in the Piedmont belt and the Great Valley. Here the soil is very good and all the forests, except little scattered patches, have been cut off. On the Appalachian ridges and the Allegheny Plateau, where the surface was rougher and the soil is not so rich, not half so much of the forests was cut off; and in many places where land was once cleared, it was found to be unproductive and the forests have been allowed to grow up again. As a result, a large part of these regions is still wooded.

So great was the lumber industry in Pennsylvania about 1860 that Williamsport handled more lumber than any other city in the United States, and it became known as the "Sawdust City."

The rapid growth of the lumber industry in Pennsylvania, although it gave the state an important business boom, meant the cutting down of thousands of acres of fine sturdy trees. Soon after 1860, trees began to grow scarce, and the lumber business declined, and to-day lumbering is done in only a few places. The most important of these are in

Lycoming, McKean, Warren, and Forest counties.

Forest Conservation. — Much of the surface of Pennsylvania is too steep for agriculture, and these areas of steep slopes should be kept in forests. Trees are the only crop that such tracts can support. If all the forests on the sides of mountains and hills are cut down, the soil is washed away by heavy rains, and in a few years the surface consists only of bare rock. Then the slopes are not able even to grow trees. If only mature trees are cut, the forests will be maintained, and at the same time a permanent supply of lumber and other wood products is furnished. Thus the maintenance of forests will not only protect the soil from erosion, but will yield the state a valuable resource.



State forests of Pennsylvania

The ground beneath the forest is covered with a thick spongy layer of leaf mold. This mold and the poorer soil beneath it absorb much of the water that falls as rain and snow. Thus in times of heavy rainfall the holding back of a considerable part of the water prevents floods from being as high as they would be otherwise. Much of the water held back by the soil and leaf mold of the forest floor gradually sinks into the ground, and weeks and months later it appears as springs to supply streams with water during the dry season. Forests thus help to maintain a flow of water during dry periods.

As a result of a demand for conservation of forests, the state has bought about a million acres of ridge land, and has created a Department of Forestry to take care of the state forests. The Department does everything possible to prevent, and keeps a careful watch for, outbreaks of forest fires, and provides means of putting out fires that have started. It allows only the largest trees to be cut, thus insuring the permanency of the forested areas. Any private owner of woodland who wishes advice as to the best method of improving his forests or wood lot may get this help from the Department free, or at very little cost.

Questions and Exercises. — 1. Name some of the most important timber trees of Pennsylvania.

2. What sections of Pennsylvania are still in forest? 3. In which counties is lumbering an important industry? 4. Name a city of Pennsylvania that was formerly a great lumber center.

5. Give reasons why steep slopes should be kept always in forest. 6. Explain how forests regulate stream flow.

7. Give some of the lines of work carried on by the Department of Forestry of Pennsylvania.

AGRICULTURE

Soils. — (1) Where are the best soils in the Piedmont Plateau? (2) Why are they so fertile? (3) Where are the poor soils of this region? (4) Why are they poor?

(5) What two belts of soil are there in the Great Valley? (6) What are the characteristics of each? Account for the differences.

A typical farmstead of Pennsylvania

(7) In what part of the Allegheny Plateau are the best soils? Why? (8) Why are the soils of the Lake Plain so rich and deep?

The climate, relief, soil, and existence of large cities in and near the state are the chief factors that determine the extent and character of agriculture in Pennsylvania. The rainfall and temperature make possible the growing of hay and grain crops. The relief largely determines the amount of land available for agriculture. At present about two thirds of the total area of the state is in farms. Much of the remainder is too steep to farm. The relief also determines to a considerable degree the depth of the soil and the methods that must be used in cultivating crops. Pennsylvania has a large variety of soils, and these have a very great control over the kinds of crops raised. The large cities create a large demand for milk, fresh fruits, and vegetables, and the production of these things is an important feature of agriculture in Pennsylvania.

Crops. — The leading crops of Pennsylvania are hay, corn, wheat, potatoes, oats, apples, tobacco, buckwheat, and rye.

Due to the rugged surface much of the farm land cannot be cultivated successfully and therefore a large acreage is devoted to hay and pasture. The five leading counties in the yield of hay are Lancaster, Bradford, Crawford, Tioga, and Susquehanna. Southeastern Pennsylvania is the chief grain-growing section of the state. Lancaster County, which is the richest agricultural county of the state and one of the five richest in the United States, leads in the yield of both corn and wheat. York County ranks second in the production of these two crops.

Potatoes are the most important of the vegetables grown in the state. Lehigh, York, Bucks, Lancaster, and Schuylkill are the leading counties in the yield of this crop. The leading orchard crop of the state is the apple. The growing of this fruit is carried on extensively in many counties. Among the counties that stand high in yield of apples are Adams, Franklin, York, Berks, Lancaster, Cumberland, and Bucks. Peaches and cherries are other important orchard fruits. The growing of grapes is a highly-developed industry in Erie County. Near the large cities are many truck farms, gardens, and greenhouses which supply fresh vegetables, fruits, and flowers. In the greenhouses many vegetables and flowers are grown in seasons when outdoor growth is impossible.

In Lancaster County, in the Lancaster Valley, the farmers have specialized in the raising of tobacco. The limestone soil of this valley produces a variety of tobacco that makes good cigars. About four fifths of all the tobacco grown in Pennsylvania is raised in this locality.

Vegetable-forcing greenhouse, New Castle

Tobacco field, York County

Farm Animals and Animal Products. — The most important farm animals of Pennsylvania are horses, cattle, hogs, sheep, and poultry. The leading animal products are milk, butter, eggs, and wool. The value of eggs and poultry produced each year is greater than that of the wheat crop. On many of the hills, sheep raising is a profitable industry, and wool is a product of considerable value.

In the large cities of Pennsylvania and neighboring states there is a steady demand for milk and other dairy products; and because of this, dairying has become the chief farm industry in the state. The leading milk-producing counties are Chester, Bradford, Crawford, Susquehanna, Berks, Erie, Montgomery, Bucks, and Washington. Every morning in all the dairying sections, farmers load milk on trains which take it to the cities. Much, however, is sold to near-by creameries, which separate the cream from the milk and make butter and cheese. Many farmers do not send their milk to the cities or creameries but make butter at their homes and deliver it to customers in the towns.

Questions and Exercises. — 1. Where is the most important agricultural region of Pennsylvania?

2. Name the most important crops of the state, the most important farm animals, and the chief animal products.

3. Why are hay crops so extensively raised in Pennsylvania?

4. Account for the importance of dairying in Pennsylvania.

5. Name the chief farm products of your own locality. Of your county.

6. Make a list of the fruits and vegetables you find in the markets. Make a list of flowers grown by florists.

7. Why is Erie County the leading grape-growing section of the state?

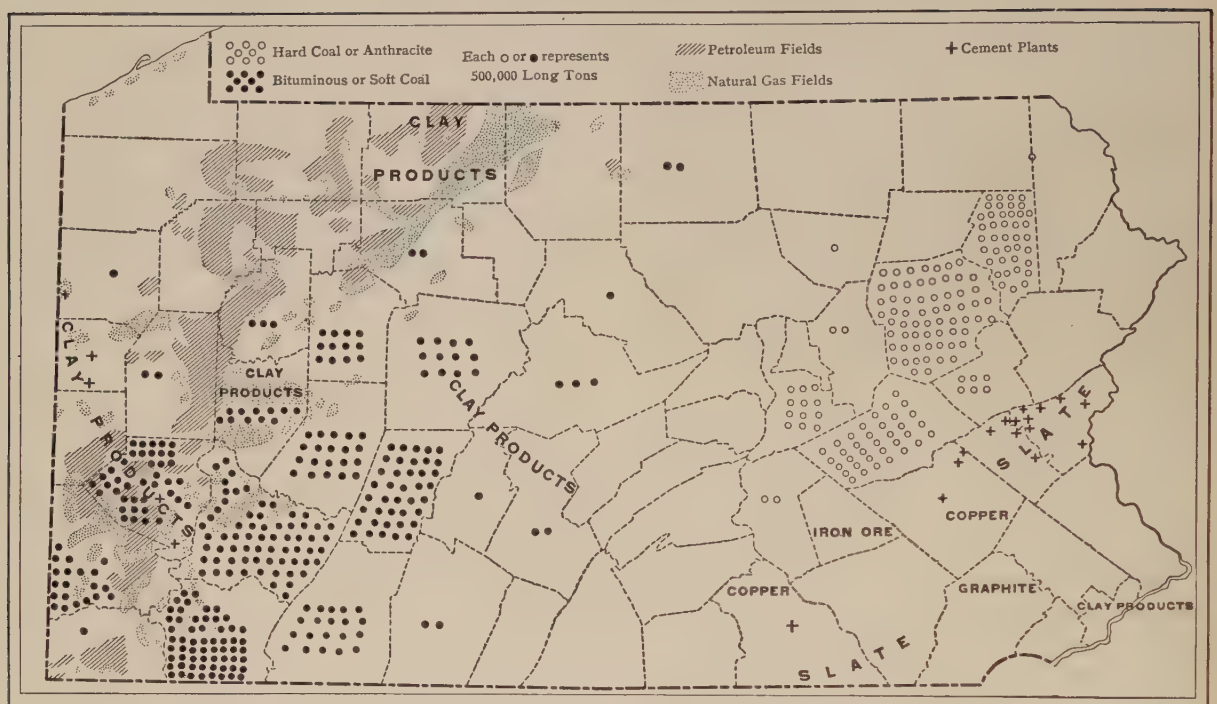
MINERAL WEALTH

Pennsylvania leads all the states of the United States in the value of the minerals produced every year. This state mines more coal, makes more cement and glass, and quarries more stone than any other state.

Pennsylvania's importance as a mining state is due chiefly to the great coal deposits,

Gardens of model homes in a mining town

Prize flower garden in a mining town



The leading mineral resources of Pennsylvania

which yield almost as much as Great Britain or Germany. This state mines more coal than all other countries of the world outside of the United States, except Great Britain and Germany. It is figured that the coal mined in Pennsylvania is worth nearly nine times as much as all the rest of the state's minerals put together. It is also about equal to all the coal produced in all the other states.

The coal of Pennsylvania lies in two different areas or "fields." One of these contains the anthracite, or hard coal, which we use in houses. The other contains the bituminous, or soft coal, which is used chiefly in factories and locomotives.

Anthracite. — The anthracite field is the smaller of the two coal areas, and is in the northeastern part of the Ridge-and-Valley belt. Here the coal is found over an area of about 480 square miles. The field is divided into three districts — the northern, the middle, and the southern. The northern district is located around the cities of Wilkes-Barre, Scranton, and Pittston. The middle field lies around the cities of Shamokin, Shenandoah, Mahanoy City, and Hazleton. The southern field is near the towns of Pottsville, Tamaqua, and Mauch Chunk. In these three districts is the largest field of anthracite found in the world, and the only important one found in the United States.

These coal beds were discovered about 1790. For many years people thought this coal was only a kind of black rock and they did not suspect it would burn. Finally, they found out that these "black stones" would burn. By 1820 people were anxious to get anthracite, and the coal mining business grew rapidly.

At first the coal was hauled by wagon to near-by rivers, and then floated down in barges to Philadelphia and Baltimore. Later, a number of canals were built for coal transportation. Shortly after 1830 railroads were started, and they were soon laid from the large cities to the coal fields. To-day a large number of railroad lines lead through the fields and very little coal is hauled by any way other than by rail.

A modern coal breaker, Wilkes-Barre

With good railroads built to haul coal from the mines to the cities, and with many people anxious to use this coal, there was soon a greater demand for it than could be supplied easily. The Englishmen and Welshmen who had done most of the mining until 1890 could not then mine it as fast as it was wanted. The result has been that in the last few years a great army of men of different nationalities have come to the United States and gone into the coal fields to work in the mines. To-day three fourths of the 175,000 men who work in the anthracite mines were either born in some other country or are the children of parents born outside of the United States.

In mining anthracite a long deep opening, known as a shaft, is dug straight down through the ground until a seam or layer of coal is reached. Then the miners dig along this seam, taking out the coal as they go. Of course, some of the coal has to be left along the sides to keep the roof from falling in. The mining of anthracite is more difficult than the mining of soft or bituminous coal where the layers of rock have not been crumpled up into folds, but are lying in a horizontal position.

After the coal is dug or blasted loose, and loaded into small cars, it is taken up through the shaft into a "breaker." This is a building in which the lumps of coal are cracked up and the pieces of slate, found mixed with them, are picked out. The picking is usually done by boys, although there are machines for this purpose. The coal is then sorted into various sizes and shipped away.

Bituminous Coal. — In addition to the large output of anthracite, or hard coal, Pennsylvania also produces more bituminous coal than any other state. A little over one third of all the soft coal produced in the United States comes from this state. The bituminous district is in the western part of the Allegheny Plateau and covers about one fourth of the entire area of the state. This soft coal area is part of the great Appalachian coal field that stretches for nearly nine hundred miles from Pennsylvania to Alabama.

The bituminous mines in Pennsylvania were developed earlier and more extensively than were those in the other states of the Appalachian region. This was due to several reasons. The coal in southwestern Pennsylvania is of the very best quality, and it lies in thick seams. This part of the coal field is nearest to the great cities in the central and eastern

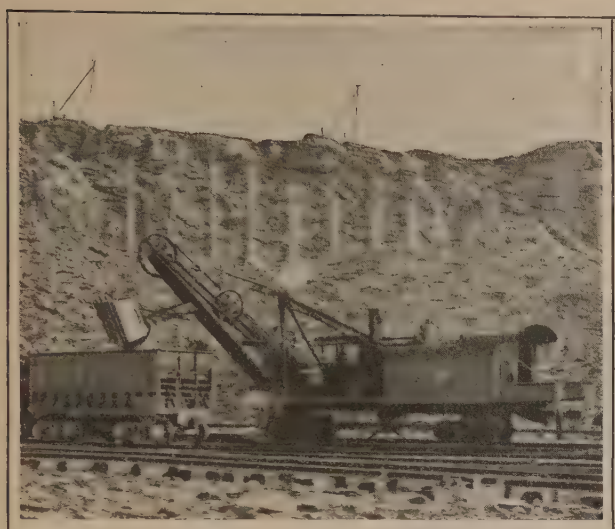
Fleet of coal barges entering the Ohio River from the Monongahela

states, where most of the coal is needed, and in Pennsylvania conditions are very favorable for easy mining. The deep river valleys that the streams have made in the Plateau frequently have cut clear through the coal seams. The miner did not have to dig a deep shaft straight down into the ground and lift the coal up to the surface. Instead, it is necessary only to dig into the side of the hill. Since the seams are level, or nearly so, the coal can be easily run out on cars and allowed to slide down into cars or boats. Pennsylvania can ship her coal easily and cheaply in many directions, by using her waterways, which costs much less than shipping by railroads. Many of the rivers that flow through the Plateau have been made navigable by means of small dams which back up the water over the shallow places, making them deeper. Small coal barges can thus be floated down the streams to the Ohio River. Once on the Ohio these flat coal barges are drifted down to markets along the Ohio and lower Mississippi rivers. Usually a large number of these barges are tied together and piloted down the river by a small steamer. When they get to the wider part of the river several fleets of them are tied together into one big raft, and go the rest of the way together. One of these rafts frequently covers nearly ten acres of water and contains from thirty-five to forty thousand tons of coal. The Pennsylvania end of the Appalachian coal field is nearest to the Great Lakes, so Pennsylvania coal has only to be shipped to Lake Erie, and it can then be sent cheaply on to all points bordering on the lakes.

In the smelting of iron, bituminous coal does not make a good fuel, because being so soft and powdery, it is apt to choke up and smother the fire. To overcome this the coal is heated in ovens, which drives off the gas and leaves the coal in hard lumps called coke. Coke in many ways is more desirable for fuel and can be used for some purposes where the ordinary coal will not do. Much of the bituminous coal of Pennsylvania makes high grade coke; and the state yields nearly two thirds of all the coke produced in the United States. The great coke-making district of Pennsylvania is near Connellsville, in Westmoreland and Fayette counties. Here the coal is heated in long rows of open ovens and the gas and smoke which are driven off in the coking process collect in great clouds.

Immense coke ovens, Pittsburgh

Phila. Commercial Museum



Quarrying cement rock, Northampton

Cement factory, Coplay

The old-fashioned "beehive" ovens needlessly waste millions of dollars every year, for it is known that the gases thus driven off could be used in many ways. They contain tar, ammonia, and other chemical products. Also, the gas could be used for heating purposes if it were collected properly. The modern, by-product or gas-saving ovens are coming into use, however.

Petroleum. — In Venango County, in 1859, the first oil-producing well was drilled. The success of this well caused a great deal of excitement all over eastern United States. Many people rushed to the oil fields, bought land, and started to drill for oil. The country there soon became dotted with the wooden derricks used in the drilling. A large part of northwestern Pennsylvania was settled during this oil boom and many new towns sprang up. By 1891 the yearly supply amounted to about 32,000,000 barrels, and Pennsylvania produced over half of all the oil in the United States. All of this Pennsylvania oil came from the northwestern part of the Allegheny Plateau, between Pittsburgh and the New York boundary. Forest, McKean, Warren, and Venango counties were the most important sections.

In 1891, the most successful year of the oil business, Pennsylvania yielded about 33,000,000 barrels of petroleum. After that many oil fields were drained out, and the industry declined just as the lumber industry had done. In 1922 Pennsylvania produced about 7,500,000 barrels, and had dropped to tenth rank among the oil states. Many fields no longer produce oil, and many of the oil towns have been abandoned and replaced by farms.

When petroleum was first secured by drilling wells it was put into barrels to be shipped away to market. This was a slow and expensive way. Later, larger tank cars were built for the transportation of oil, and today, pipes have been laid underground all the way from the petroleum regions to the big cities, and the oil is pumped through. From the Pennsylvania fields pipe lines extend to Philadelphia and to the cities around New York Bay. At these and other points, the oil is heated and separated into a great many products, such as kerosene, gasoline, benzine, naphtha, lubricating oils, and paraffin.

Natural Gas. — For many years Pennsylvania stood first among the states in the production of natural gas, but recently West Virginia has surpassed her, and a large part of the gas of

West Virginia is now brought into Pennsylvania for use.

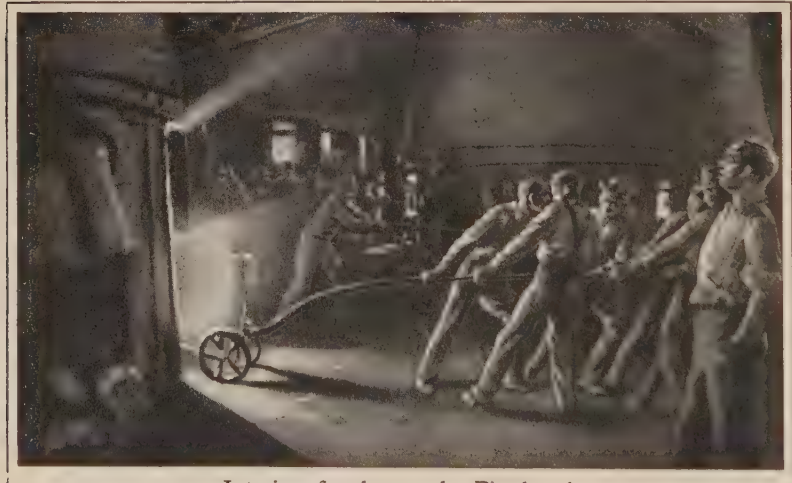
Cement. — Pennsylvania leads all the states of the Union in the manufacture of cement. This state has an abundance of the minerals used in making cement and of coal which furnishes the heat that is necessary in the manufacturing process. One of the most important cement-manufacturing districts of the United States is in eastern Pennsylvania, in Lehigh and Northampton counties. This locality, known as the Lehigh district, produces 30 per cent of the total cement output of the United States. Other cement-producing centers are Pittsburgh, York, and New Castle.

Most of the cement manufactured in the United States is made of clay and limestone. These materials are ground to a fine dust, mixed together, and heated to a high temperature. The clinkers formed by the great heat are then pulverized to a fine powder. This powder is cement. A considerable amount of cement is made from a natural cement rock and limestone. The cement of the Lehigh district is made from these two materials. A small amount is made from blast-furnace slag and limestone. When cement is mixed with sand, gravel, or crushed stone, and water, the whole mass hardens into solid rock. This is called concrete, and is used in the construction of heavy masonry, such as foundations, walls, bridges, and aqueducts.

Limestone. — Pennsylvania produces more limestone than any other state, most of which comes from Blair County. Limestone is used chiefly in the iron furnaces as a help in smelting the ore. It is also burned to make lime, especially throughout the Great Valley. It is also used for making good roads.

Slate. — People who travel through the eastern part of the Great Valley notice that most of the country buildings have slate roofs. This slate comes from a belt of quarries that stretch from Slatington, on the Lehigh River, to Bangor, near the Delaware River. You remember that the northwestern half of the Great Valley is underlain by shale and slate instead of limestone. These quarries produce over half of all the slate quarried in the United States. The largest slate quarry in the world is at Bangor. It is over three hundred feet deep.

Clay. — Pennsylvania has extensive deposits of clay, and the state ranks second in value of clay products. In and around Philadelphia many of the buildings are made of brick because there is a narrow belt of clays extending along the Delaware River at Philadelphia which make excellent brick. The presence of so many brick buildings is said to be the reason why Philadelphia has not had large fires, as many other cities have had. Pittsburgh is another center of clay-working industries. Some of the formations between the layers of coal consist of clay, and these deposits are utilized in the manufacture of brick, sewer pipe, and other clay products.

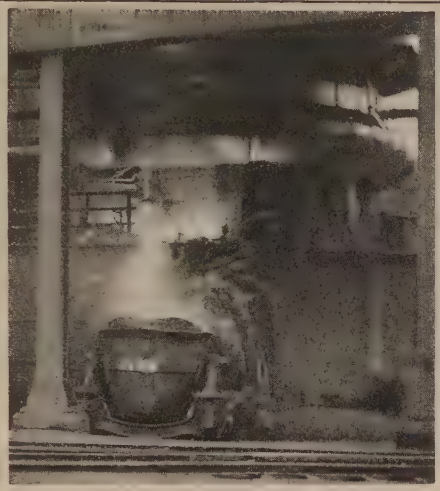


Interior of a glass works, Pittsburgh

Glass Sand. — In western Pennsylvania the weathering of sandstone rock gives a

sand which, when it is melted and cooled, forms a clear, pure glass. As natural gas is an ideal fuel in melting sand for glass, and the Allegheny Plateau is a region of natural gas, the glass-making industry has grown up in this part of the country. One third of all the glass made in the United States now comes from this region.

Questions and Exercises.— 1. Name the most important minerals of Pennsylvania. 2. What is the rank of the state as a producer of coal? 3. How does anthracite differ from bituminous coal? 4. What are the chief uses of each? 5. Where is the anthracite district of Pennsylvania? The bituminous district? 6. Describe the process of mining coal. 7. What is coke? 8. Describe how it is manufactured. 9. What is the present rank of Pennsylvania as an oil-producing state? 10. Name the chief building stones of Pennsylvania. 11. What minerals are used to make cement? 12. What is concrete? 13. How is it made? 14. What products are made of clay? 15. Where are the two most important centers of the clay-working industries?



Molten iron pouring from a smelter

MANUFACTURING

The great resources of coal and natural gas have given Pennsylvania an abundance of cheap fuel which attracted many lines of manufacturing to the state. In 1920 Pennsylvania ranked higher in manufacturing than any other state except New York. Of all the various branches of manufacturing, the iron and steel industry and the textile industry are most important. These two industries alone employ nearly one half of all the people engaged in manufacturing in Pennsylvania.

Iron and Steel. — To make iron it is necessary to have iron ore, coke, and limestone. These materials are dumped into a blast furnace. The coke burns and produces the heat to melt the iron ore. The limestone combines with the impurities of the ore, forming slag. A tremendous draft of heated air is forced in from below to make this great mass burn more vigorously. The molten iron falls to the bottom of the furnace, and the limestone and impurities form a liquid mass which floats on the melted iron. At certain intervals the iron and slag are drawn off through separate openings. When the iron is drawn from the furnace it is poured into ladles which carry it directly to the steel mills, or it is allowed to flow into trenches in a sandy floor. From each of the main trenches a number of short ones lead off in parallel rows. All iron drawn from a blast furnace is known as "pig iron."

Blast furnaces, near Braddock

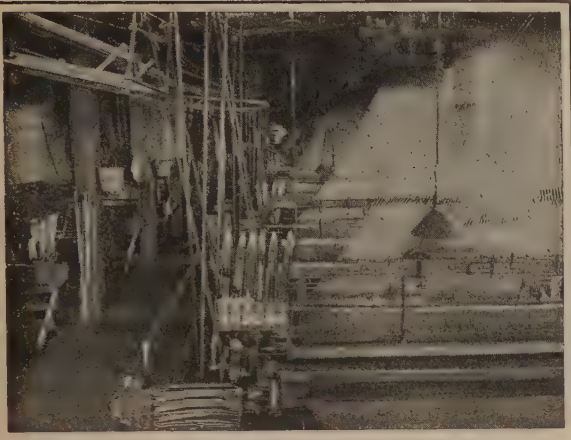
Making traction engines, York

After smelting, the pig iron is taken to mills where it is converted into steel. Some chemical elements are taken out or others added to make the metal of desired quality. After these changes have been made, the iron is known as steel. Steel is made into many different shapes, either by running it into certain shaped molds or by rolling it out with great rollers. It is then cut and bent and fitted into proper shapes to make machines, steel rails, bridges, locomotives and hundreds of other things.

The manufacture of iron began first in Easton, Pennsylvania. The iron ore in the Ridge-and-Valley country was used before the Revolution in blast furnaces scattered all over eastern Pennsylvania. These early furnaces did not use coal for fuel, but charcoal. Iron makers found that anthracite could be used to smelt their ore, and that it was superior to charcoal as a fuel. They began to locate as near as they could to the hard-coal mines, and the iron industry developed rapidly. Three iron-manufacturing centers grew up along the river valleys through which the coal was carried from the fields. These centers were in the Lehigh Valley, chiefly at Allentown and South Bethlehem, in the Schuylkill Valley, at Pottstown and Phoenixville, and in the Susquehanna Valley, at Harrisburg and Lebanon.

After much experimenting it was found that bituminous coal made into coke was

Steel plant, Homestead



Weaving room in a silk mill, Philadelphia

better than anthracite to use in smelting iron. The iron business then began to move slowly from the anthracite fields in eastern Pennsylvania to the bituminous fields in western Pennsylvania. By 1875 the new center was ahead of the old centers in the anthracite region, and about this time the ore deposits of the eastern part of the state began to be exhausted. Then it was discovered that in Minnesota there were deposits of iron ore far richer than any in Pennsylvania. It was cheaper to ship this ore to the Pennsylvania soft-coal fields than to ship the Pennsylvania coal and limestone to Minnesota. Moreover, if the smelting was done in Pennsylvania, the iron, when finished, was nearer the large eastern cities. Therefore, the industry remained in western Pennsylvania, and the iron ore was brought from Minnesota. The business has grown until Pennsylvania now produces over one half of the pig iron and steel made in the United States. Most of the iron business has centered in Pittsburgh and its suburban towns—McKeesport, Duquesne, and Homestead. This district makes more iron and steel than any other place of the same size in the world. Its output is greater than the combined product of France, Russia, and Belgium. Johnstown and New Castle are other important centers.

Some iron and steel manufacturing is still carried on in eastern Pennsylvania, and most of the eastern blast furnaces use ore brought from Cuba and Sweden.

Textiles. — Next in importance among the manufacturing industries is the making of cotton cloth, woolen cloth, silk, and other textiles. Many of the early settlers of Pennsylvania were men who had worked in textile industries in Europe, so when they came to Philadelphia it was natural that many of them should continue at their old trades. After 1820 the textile towns in the Piedmont began to obtain anthracite; and by 1852 bituminous coal was being shipped to Philadelphia. These cheap sources of power made the textile industry grow very rapidly.

Since 1890 many silk mills have moved into eastern Pennsylvania not only because of abundant labor but because the anthracite mines furnished a cheap fuel. The silk industry has grown until now three fifths of all the silk yarn made in the United States comes from these mills. The chief centers are Allentown and Scranton.

Interior of a silk-ribbon mill, York

TRANSPORTATION

The early settlement of the western part of Pennsylvania was beset with many difficulties. The rough land of the Appalachian Mountains and Allegheny Plateau for a long time checked settlement. The first attempts to establish trails across this country were made for military purposes. One of these was surveyed by George Washington, then a young colonel in the British army. This trail was later used by General Braddock on his fatal expedition to Fort Duquesne. Later, Congress appropriated money for the building of a national turnpike. This highway, known as the National Road, was built between 1811 and 1818. It extended from Cumberland, Maryland, to the Ohio River at Wheeling, West Virginia, passing through Uniontown, Pennsylvania. This good road opened up southwestern Pennsylvania to settlement, and a steady stream of people poured west to settle western Pennsylvania and the Ohio Valley. Large quantities of grain, meat, and other products of western Pennsylvania were carried on flatboats down the Ohio. So much easier was it to ship goods down the rivers by boat that the grain and meat of the West rarely were carried east in wagons over the National Road. If the products were to go to Philadelphia or New York, they were sent by river from Pittsburgh to New Orleans and then sent by ship to their destination.

Railroads. — The chief railroad system in the state is the *Pennsylvania system*. The main line, extending from New York to Chicago and St. Louis, passes through Philadelphia, Harrisburg, Altoona, and Pittsburgh. Other lines of this system connect many towns and cities of the state with Cleveland, Buffalo, and other points on the Great Lakes.

The following are some of the other important railroads in Pennsylvania:

The *Baltimore and Ohio Railroad* extends from Philadelphia to Baltimore and Washington and then westward through Cumberland, Maryland, to St. Louis. From Cumberland one line extends northwestward through Pittsburgh to Chicago and other points on the Great Lakes.

The *Erie*, the *Lehigh Valley*, and the *Delaware, Lackawanna and Western* railroads extend through the northeastern part of the state. The main line of each extends from New York to Buffalo; and each has branch lines that penetrate into many parts of the anthracite region of the state.

Railroad bridge over the Ohio River, Beaver

Concrete bridge on the Lackawanna Railroad, Nicholson

The *Philadelphia and Reading Railway* connects Philadelphia with South Bethlehem, Reading, Williamsport, Harrisburg, and many other points in southeastern Pennsylvania; and it has connections with New York. The *Central New Jersey Railroad* connects Scranton, Wilkes-Barre, Bethlehem, and other points in the anthracite district with New York. The *Delaware and Hudson Railroad* extends from Wilkes-Barre to Albany and other points in New York. The *New York, Ontario and Western Railway* extends northward from Scranton to Oswego, on Lake Ontario. The *Buffalo, Rochester, and Pittsburgh Railway* connects Pittsburgh, New Castle, and other points in western Pennsylvania with Buffalo and Rochester. The *Pittsburgh and Lake Erie Railroad* connects Pittsburgh with Youngstown, Ohio. From the latter place the trains of this railroad run over the *Erie Railroad* to Cleveland. The *Wheeling and Lake Erie Railroad* connects Pittsburgh with Cleveland, Lorain, Huron, and Toledo. The *Wabash Railroad* runs westward from Pittsburgh to Chicago and to Kansas City and Omaha.

The *New York Central system* has numerous branches in north central Pennsylvania. The Beech Creek branch connects Williamsport with Jersey Shore, Lock Haven, Clearfield, Patton and the mining regions of Clearfield County. The Falls Brook branch extends from Williamsport through Lycoming and Tioga counties to the main line of the system in the state of New York.

Questions and Exercises. — 1. What navigable waters border Pennsylvania? 2. What navigable streams penetrate into the state?

3. Name the most important railroads of Pennsylvania. 4. Name several cities located on each. 5. On what railroad or railroads is your home town situated?

6. Where are some of the water gaps that have been utilized as gateways for railroads passing through mountain ranges? 7. Show how extensively the railroads of Pennsylvania follow river valleys.

State Capitol, Harrisburg

GOVERNMENT

The Constitution of Pennsylvania was adopted in 1874. The lawmaking power of the state is vested by the constitution in a General Assembly. The Gen-

eral Assembly consists of a Senate of fifty men elected for four years, and a House of Representatives of two hundred and seven members elected for two years. This legislative body meets at the state capital, Harrisburg, every two years.

The constitution vests the executive power of the state in the hands of the governor, who must be at least thirty years old. He is chosen by the people every four years. He cannot be elected for two terms in succession. The lieutenant governor acts as the presiding officer of the Senate; and in case the governor for any reason becomes unable to perform his duties, the lieutenant governor takes his place. Other officers of the executive department are auditor-general, state treasurer, secretary of internal affairs, secretary of the commonwealth, attorney-general, and superintendent of public instruction. The last three are appointed by the governor; the others are elected by the people.

The power to interpret the laws of Pennsylvania is vested in a number of courts of various degrees. The highest of these is the State Supreme Court, which consists of seven judges who are elected by the people for a term of twenty-one years. In 1896 the General Assembly established the Superior Court to assist the Supreme Court. In addition to these courts each county has its own courts and each voting district has its magistrate or justice of the peace, who tries petty cases.

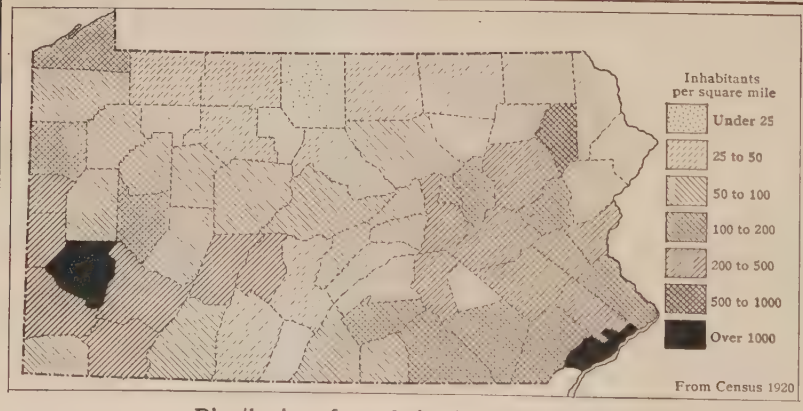
Phila. Commercial Museum

University of Pennsylvania, Philadelphia

EDUCATION

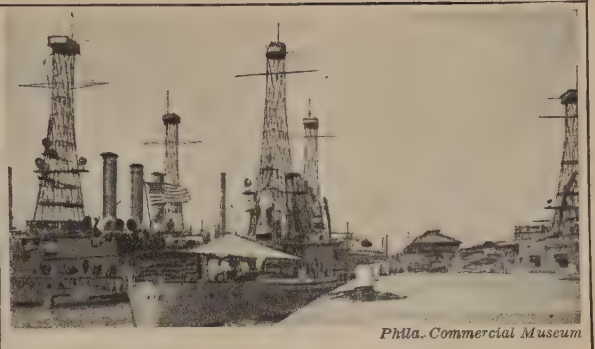
The constitution provides that the state shall maintain public schools for the education of all children over six years of age. These public schools include elementary, vocational, continuation, high, and state normal schools. The last named schools, which are for the training of teachers, are managed by boards of trustees under state control. The other public schools are managed by boards of directors. The county superintendent, elected by the school directors, has supervision over the county schools. All the public schools of the state are under the general direction of the superintendent of public instruction and the state board of education.

In addition to the public school system there are a great many private schools and colleges. Two of the most important of these colleges are the University of Pennsylvania at Philadelphia and the University of Pittsburgh. In Center County is Pennsylvania State College which is supported by state and Federal funds. It is especially noted for its courses in



Distribution of population in Pennsylvania

Sugar refinery, Philadelphia



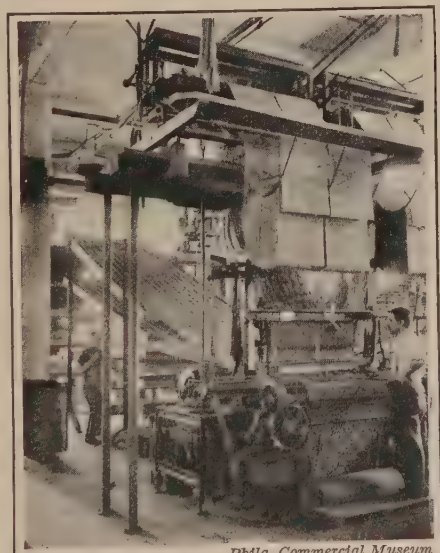
League Island Navy Yard, Philadelphia

agriculture, which may be taken by residents of the state without charge. The state has fourteen normal schools, and also supports institutions for the insane, feeble-minded, deaf and dumb, blind, and orphans.

POPULATION AND CITIES

Distribution of Population. — Study the map showing the distribution of population in Pennsylvania. Where are the sparsely settled regions? Account for them. Where are the regions of comparatively dense population? How do you account for the density of these areas? Where are the two most densely populated centers of the state?

Philadelphia. — Several geographic conditions have been active forces in the growth of Philadelphia. This city, situated on the Delaware River, is at the head of navigation for sea-going vessels (Fig. 143). Although a considerable distance inland, it is a seaport. Two great bridges cross the Delaware River, connecting the city with Camden, New Jersey; one is a railroad bridge, the other connects the business sections of the two cities and is largely used for vehicular traffic. Water power near the city led to extensive manufacturing even in the early days of the city. Many of the early settlers from Europe were skilled workmen, and they started many industries in or near Philadelphia. The streams gave the chief power for their mills and factories; and a good harbor enabled them to ship their products to all parts of the world and to receive raw materials from other lands. Another great advantage which Philadelphia has enjoyed is her nearness to the coal fields which have given cheap fuel for manufacturing purposes.



Carpet weaving loom, Philadelphia

Largely because of favorable location, Philadelphia has become a large city, ranking third in population among the cities of the United States. It is also the third seaport of the country, ranking next to New York and New Orleans. Philadelphia is mainly a textile city, this industry far outranking any other. One quarter of the people who work in factories are in some one of the many kinds of textile mills. Philadelphia leads the cities of the United States in the amount of knit stockings, sweaters, and underwear manufactured. This city produces one third of the factory-made carpets of the United States,—more than any other city. It also makes more felt hats than any other city. The second great manufacturing industry of Philadelphia is printing and publishing. Next in importance to printed matter are the machine-shop products of Philadelphia. Here steel is manufactured into a great many things, from saws and ham-

Phila. Commercial Museum

Locomotive works, Philadelphia

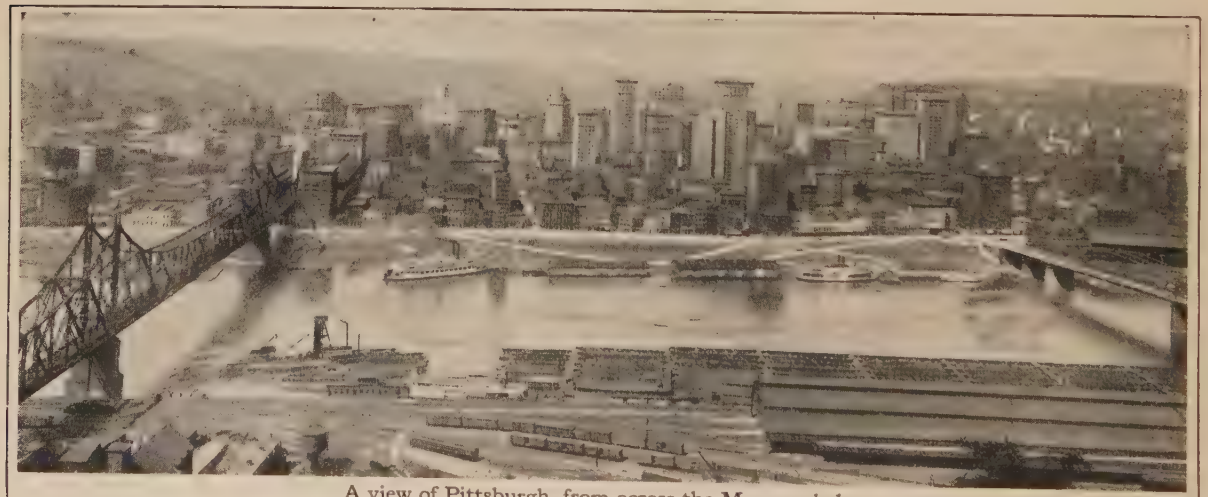
mers to engines. Philadelphia turns out more locomotives than any other city in the world. Large numbers of street cars are manufactured in this city. Shipbuilding is an important industry and one of the government navy yards is located here. The manufacture of women's clothing and leather, sugar refining, and petroleum refining are other important industries of Philadelphia.

In Philadelphia are many buildings of historic importance, chief of which is Independence Hall. The Art Museum is situated at the head of the Parkway and at the entrance to Fairmount Park. Prominent among the many educational institutions in the city is the University of Pennsylvania.

The Sesqui-Centennial Exposition, celebrating the one hundred and fiftieth anniversary of American independence, was held in Philadelphia in 1926.

Pittsburgh.—The rich coal fields are chiefly responsible for the development of a great manufacturing center in western Pennsylvania. Pittsburgh became this center because of her situation at the place where the Monongahela and Allegheny rivers (Fig. 146) unite to form the Ohio. This site was an ideal place for early trade, when transportation was mainly by water. Pittsburgh is a convenient meeting place of the iron ore of Minnesota and the coke and limestone of Pennsylvania. After the iron is manufactured, part of it at least can be shipped away by the Ohio and Mississippi rivers to points in the central part of the United States. Because of these advantages Pittsburgh has become the greatest iron-manufacturing center in the world. Pittsburgh's wealth of fuel has also caused this city to become the center for most of the glass manufacturing of Pennsylvania. The glass industry of Pittsburgh, is, however, a dwarf compared to the giant iron and steel business.

Scranton is the third city in population in the state. It is located in the anthracite region, and a large part of the population are engaged in mining. It is also an important point for the



A view of Pittsburgh, from across the Monongahela

shipment of anthracite. The city has large silk mills, railroad repair shops, and foundries and machine shops.

Reading is situated at the gap which the Schuylkill River has cut through South Mountain. As a manufacturing city it ranks next to Pittsburgh. Steel works and rolling mills are the leading manufacturing plants of the city. Railroad repair shops, mills for the manufacture of hosiery and knit goods, hat factories, foundries and machine shops, and shoe factories are other manufacturing establishments of the city.

Wilkes-Barre, on the North Branch of the Susquehanna River, is situated near the center of the anthracite region, and is an important center for coal shipments. The leading manufactured products of the city are silk and silk goods, vehicles, cotton goods, locomotives, and wire.

Courthouse, Wilkes-Barre

Business section of Scranton

Erie is a port of entry on Lake Erie. It is an important shipping point for coal, petroleum, iron, lumber, and grain. Its leading manufactories are foundries and machine shops, flour mills, steel works and rolling mills, and electrical works.

Harrisburg, situated on the Susquehanna River, is the capital of Pennsylvania. Its leading manufacturing establishments are steel works and rolling mills, shoe factories, railroad repair shops, foundries and machine shops, and blast furnaces.

Johnstown, situated in the bituminous-coal district, is an important center of the iron and steel industries. Its blast furnaces, steel works and rolling mills, and foundries and machine shops yield about nine tenths of the value of the total manufactured products of the city.

Altoona is situated on the eastern slope of the Allegheny escarpment. The workshops of the Pennsylvania Railroad, which are located here, are the largest in the United States. A few miles west of the city is the famous Horseshoe Curve by

Freight boat at dock, Erie

Grinding lenses, Reading

Public library, Easton

which the Pennsylvania Railroad ascends the steep face of the Allegheny Plateau.

Allentown is an important center of the textile industries. Among the cities of Pennsylvania it ranks next to Philadelphia in this group of industries. Silk and silk goods are the chief products of the textile mills. Other manufactures are iron and steel products, boots and shoes, and automobiles.

Lancaster, the county seat of Lancaster County, is situated in the rich agricultural section. This city is an important tobacco market. Silk, machinery, leather, linoleum, cigars, candies, umbrellas, and watches are among the leading manufactures. Lancaster is also an important publishing center. Franklin and Marshall College is located here.

York, the county seat of York County, is surrounded by a fertile farming region, and is an important commercial and manufacturing center. Machinery, silk and hosiery, paper, and dental supplies are some of the leading manufactured products of this city.

McKeesport, in Allegheny County, is situated at the junction of the Monongahela and the Youghiogheny rivers. Coal and natural gas are obtained in the vicinity. Blast furnaces; iron, steel, tube, and tin-plate works; and glass works are the leading manufactories of this city.

Chester, on the Delaware River, has large ship yards, blast furnaces, rolling mills, foundries, and machine shops, and cotton and woolen mills. It is the oldest town in the state, and a monument marks the spot where William Penn first landed in Pennsylvania in 1682.

New Castle, the county seat of Lawrence County, is an important railroad center and manufacturing city. Blast furnaces, steel works, foundries, and machine shops, tin-plate works, bronze works, rubber works, car shops, stove factories, cement works, and paper mills are among its leading industrial plants.

Williamsport, the county seat of Lycoming County, is the leading lumber market of the state and the center of numerous wood-working industries. Furniture and other wood products, wire rope, leather, nails, woolen goods, boots and shoes, machinery, and cigars are leading products of the city. Dickinson Seminary is located here.

Easton, the county seat of Northampton County, is situated at the mouth of the Lehigh River. This city is the center of the large cement industry of the Lehigh district. Mining machinery and silk and knit goods are other products of the city. Lafayette College is located here.

Norristown, the county seat of Montgomery County, is located on the Schuylkill River. Extensive deposits of limestone, marble, and sandstone are in the vicinity of this city. Tin plate, woolen and cotton goods, carpets, hosiery, and

Sheet and tin-plate mills, New Castle

brick are some of its leading manufactures. The Eastern Pennsylvania Hospital for the Insane is at this place.

Shenandoah, in Schuylkill County, is an important mining center in the anthracite region.

Hazleton, in Luzerne County, is situated in the Lehigh anthracite field. Iron and steel products, silk, and knitted goods are among the leading manufactures of this city.

Butler, the county seat of Butler County, is situated near coal mines, oil wells, and limestone quarries. Plate and bottle glass, brick, oil-well machinery, steel cars, and woolen goods are some of the most important products of this city.

Pottsville, the county seat of Schuylkill County, is an important shipping point of anthracite. This city has iron and steel works, packing houses, and railroad car shops.

South Bethlehem, in Northampton County, on the Lehigh River, is an important manufacturing center. Heavy guns, armor plate, machinery, refined zinc, and knit goods are some of the leading manufactures. Lehigh University is in this city.

Shamokin, in Northumberland County, ships a large quantity of anthracite. Machinery and silk goods are some of its leading manufactured products.

Braddock, in Allegheny County, on the Monongahela River, manufactures iron and steel, cars, bridges, wire, and machinery.

Lebanon, the county seat of Lebanon County, manufactures iron and steel, engines, boilers, cars, machinery, stoves, furniture, and organs.

Nanticoke, in Luzerne County, is largely engaged in the mining and shipping of coal. Silk goods, hosiery, and brick are manufactured.

Washington, the county seat of Washington County, manufactures tin plate, tubes and pipes, tools, glass, machinery, and flour. Here is the seat of Washington and Jefferson College.

Homestead, in Allegheny County, on the Monongahela, has large steel works. This city also manufactures machinery, glass, brick, and bridges.

Dunmore, in Lackawanna County, near Scranton, is extensively engaged in mining and shipping anthracite. Here are railroad car shops, silk mills, and stove works.

Mt. Carmel, in Northumberland County, ships large quantities of coal from the anthracite mines in the vicinity. Here are iron works and silk and hosiery mills.

Carbondale, in Lackawanna County, is an important shipping point for anthracite. Machine shops, boiler and tank works, car shops, and silk mills are important industrial plants of this city.

Plymouth, in Luzerne County, ships coal, and manufactures mine drills and knit goods.

Pittston, in Luzerne County, has planing mills, machine shops, railroad car shops, and paper, silk, and knitting mills. It is also a shipping point for anthracite.

Mahanoy City, in Schuylkill County, is situated near a large number of anthracite mines and is an important shipping point for coal.

Duquesne, in Allegheny County, is an important manufacturing center. The leading industrial plants are blast furnaces and steel mills.

Oil City, in Venango County, on the Allegheny River, is an important oil market. Here are oil refineries, machine shops, engine and boiler works, and railroad shops.

Pottstown, in Montgomery County, on the Schyulkill River, has blast furnaces, steel mills, foundries and machine shops, nail works, automobile factory, and hosiery and silk mills.

Sharon, in Mercer County, on the Shenango River, has blast furnaces, steel mills, nail works, and boiler factories. Several coal mines are in the vicinity.

McKees Rocks, in Allegheny County, manufactures iron and steel, enamel ware, and steel springs. Railroad car shops are located here.

Bradford, in McKean County, is the center of the northwestern oil field. The city has oil refineries, factories for the manufacture of oil-well supplies, machine shops, and chemical works.

Steelton, in Dauphin County, near Harrisburg, manufactures steel rails, forgings, bridges, and architectural steel.

Sunbury, the county seat of Northumberland County, and an important railroad center, is a shipping point for coal and lumber. The city manufactures flour, silk goods, and carpets.

Uniontown, the county seat of Fayette County, manufactures coke, iron castings, brick, and radiators.

Greensburg, the county seat of Westmoreland County, has coal mines and gas wells in the vicinity. Coke, engines, glass, brass fittings, and structural steel are manufactured here.

Connellsville, in Fayette County, is the industrial center of the Connellsville coke region. Coke, safes, glass, brick, mining cars, and coking machinery are the leading products of this city.

Bethlehem, in Northampton County, on the Lehigh River, manufactures silk and knit goods, paint, iron and steel, and zinc.

Meadville, the county seat of Crawford County, has iron and boiler works, foundries, machine shops, and car shops.

Dubois, in the coal field of Clearfield County, manufactures glass, coal cars, machinery, and leather.

Beaver Falls, in Beaver County and on Beaver River, has coal, natural gas, and stone in the vicinity. Shovels, wire, and stoves are some of the leading manufactured products.

North Braddock, in Allegheny County, manufactures brick and tile.

Chambersburg, the county seat of Franklin County, is situated in a rich agricultural district. The city has large grain elevators, flour mills, and machine shops.

Monessen, in Westmoreland County, has steel and tin-plate mills, wire-fence works, and foundries.

West Chester, the county seat of Chester County, is beautifully situated in a fertile farming section. It has foundries, machine shops, and planing mills.

Columbia, in Lancaster County, is the trade center of a rich agricultural district. It manufactures engines, machinery, stoves, iron pipe, brick, and leather.

Old Forge, in Lackawanna County, is in the anthracite district. It has silk mills and other manufacturing plants.

Coatesville, in Chester County, has blast furnaces, steel mills, boiler works, and elevator factories.

Warren, the county seat of Warren County, is a center of the petroleum industry. It refines oil and manufactures furniture, hubs, handles, and other wood products.

Phœnixville, in Chester County, on the Schuylkill, manufactures steel bridges, architectural steel, boilers, and knit goods.

Carlisle, the county seat of Cumberland County, is situated in a fertile agricultural section. It manufactures flour, lumber, shoes, brick, office equipment, carpets, and rugs.

Farrell, in Mercer County, manufactures steel, wire, tin plate, castings, and boilers.

Carnegie, in Allegheny County, is an important manufacturing center. Steel, sheet iron, structural iron, and machinery are some of the leading manufactured products.

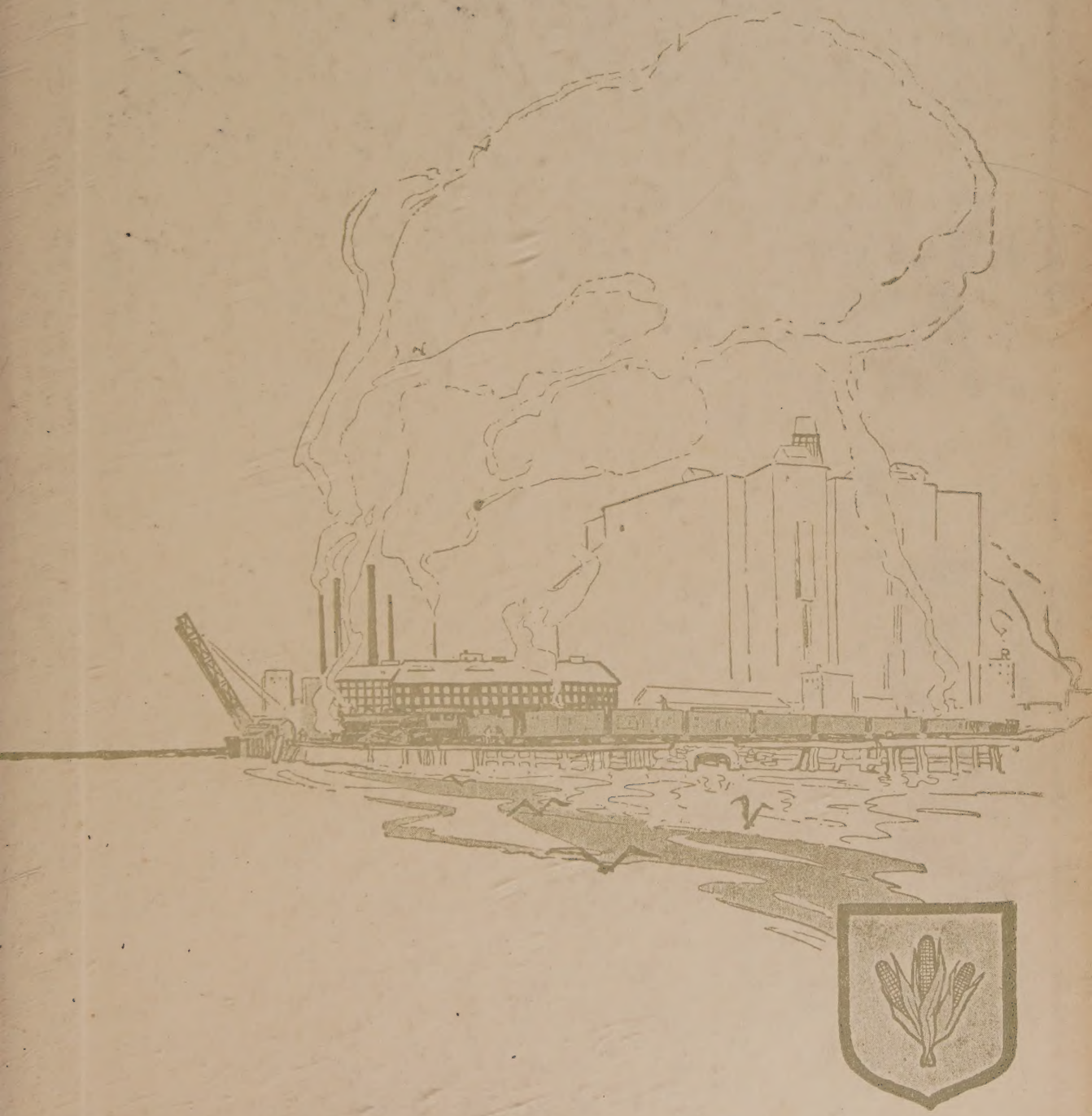
Some of the other industrial centers of Pennsylvania are: **Scottdale**, the site of a large iron-pipe works in Westmoreland County; **Bristol**, Bucks County, an important center of patent-leather manufacture; **Berwick** and **Bloomsburg**, Columbia County; **Lewistown**, Mifflin County; **Honesdale**, an important center of cut-glass manufacturing in Wayne County; **Stroudsburg**, Monroe County; **Clearfield**, Clearfield County; **Punxsutawney**, Jefferson County; **Franklin**, an oil center in Venango County; and **Palmerton**, the site of a large zinc works in Carbon County.

TABLE I. — SOME OF THE LEADING COLLEGES OF PENNSYLVANIA

Albright College, Myerstown.
Allegheny College, Meadville.
Bryn Mawr College, Bryn Mawr.
Bucknell University, Lewisburg.
Carnegie Institute of Technology, Pittsburgh.
Dickinson College, Carlisle.
Franklin and Marshall College, Lancaster.
Geneva College, Beaver Falls.
Grove City College, Grove City.
Haverford College, Haverford.
Juniata College, Huntingdon.
Lafayette College, Easton.
La Salle College, Philadelphia.
Lebanon Valley College, Annville.
Lehigh University, South Bethlehem.
Lincoln University, Lincoln University.
Moravian College, Bethlehem.
Moravian College for Women, Bethlehem.
Muhlenberg College, Allentown.
Pennsylvania College, Gettysburg.
Pennsylvania College for Women, Pittsburgh.
Pennsylvania State College, State College.
Susquehanna University, Selinsgrove.
Swarthmore College, Swarthmore.
Temple University, Philadelphia.
Thiel College, Greenville.
University of Pennsylvania, Philadelphia.
University of Pittsburgh, Pittsburgh.
Ursinus College, Collegeville.
Villanova College, Villanova.
Washington and Jefferson College, Washington.
Waynesburg College, Waynesburg.
Westminster College, New Wilmington.
Wyoming Seminary, Kingston.

TABLE II. — STATE NORMAL SCHOOLS

State Normal School, Bloomsburg.
Southwestern State Normal School, California.
Clarion State Normal, Clarion.
East Stroudsburg State Normal School, East Stroudsburg.
State Normal School, Edinboro.
Indiana Normal School of Pennsylvania, Indiana.
Keystone State Normal School, Kutztown.
Central State Normal School, Lock Haven.
Mansfield State Normal School, Mansfield.
State Normal School, Millersville.
Cumberland Valley State Normal School, Shippensburg.
Slippery Rock State Normal School, Slippery Rock.
State Normal School, West Chester.



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